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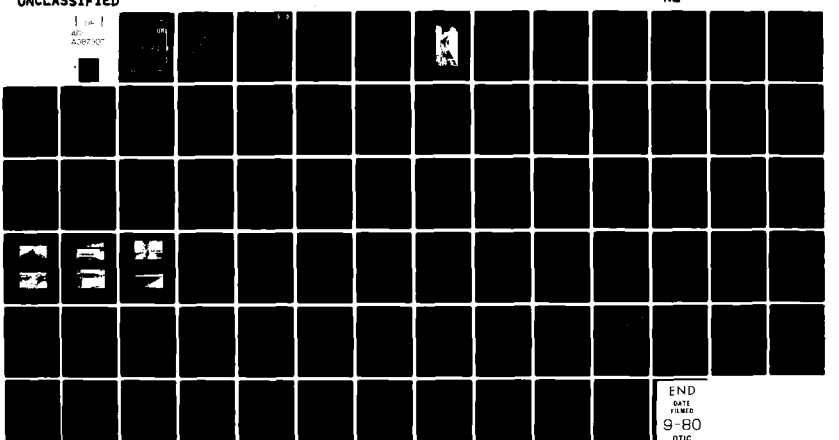

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DELAWARE RIVER BASIN

MC CONNELL LAKE DAM

NDI NO. PA-00398
DER NO. 52-91

LEVEL A

PIKE COUNTY, PENNSYLVANIA

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

PREPARED FOR
DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

BY

Berger Associates, Inc.
Harrisburg, Pennsylvania

JUNE 1980

BERGER ASSOCIATES, INC.
DACW31-80-C-0019

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PREFACE

This report has been prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through frequent inspections can unsafe conditions be detected and only through continued care and maintenance can these conditions be prevented or corrected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (greatest reasonably possible storm runoff), or fractions thereof. The spillway design flood provides a measure of relative spillway capacity and serves as an aid in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT

NATIONAL DAM INSPECTION PROGRAM

BRIEF ASSESSMENT OF GENERAL CONDITIONS
AND RECOMMENDATIONS

Name of Dam:	McCONNELL LAKE DAM
State & State No.:	PENNSYLVANIA, 52-91
County:	PIKE
Stream:	McCONNELL CREEK
Date of Inspection:	April 2, 1980

Based on the visual inspection, past performance and the available engineering data, the dam and its appurtenant structures appear to be in fair condition.

In accordance with the Corps of Engineers' evaluation guidelines, the size classification of this dam is intermediate and the hazard classification is significant. For a dam with these classifications, the Spillway Design Flood (SDF) should be in the range of one-half the Probable Maximum Flood (PMF) to the full PMF. The recommended SDF for this dam is one-half of the PMF. The spillway capacity is inadequate to pass the SDF peak inflow without overtopping the dam. The project is capable of passing 29 percent of the PMF and is considered to be inadequate, but not seriously inadequate.

The following recommendations are presented for immediate action by the owner:

1. That a detailed hydrologic and hydraulic engineering analysis be made by a professional engineer with experience in the design and construction of dams to determine means for improving the capacity of the spillway and reservoir system so that it will meet the requirements of the Commonwealth of Pennsylvania.

2. That all brush and trees be removed from the embankment slopes and that this maintenance be repeated on a regular basis.

3. That at least the two top valves be greased and operated on an annual basis.

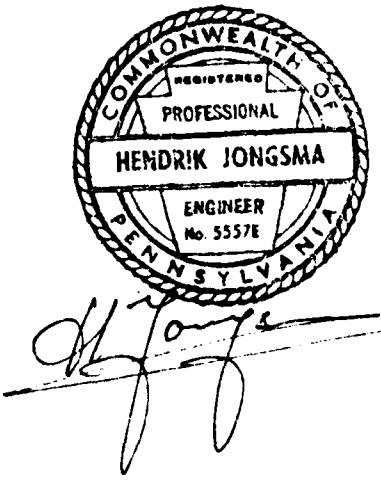
(4.) That a formal surveillance plan and downstream warning system be developed for implementation during periods of high or prolonged precipitation, and

(5.) That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

SUBMITTED BY:

BERGER ASSOCIATES, INC.
HARRISBURG, PENNSYLVANIA

DATE: June 19, 1980



APPROVED BY:

JAMES W. PECK
Colonel, Corps of Engineers
District Engineer
DATE 11 July 1980

OVERVIEW

MCCONNELL LAKE DAM

Photograph No. 1

TABLE OF CONTENTS

15 DACW31-80-C-0019

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12 80 6

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM

McCONNELL LAKE DAM

NDI-ID PA-00398
DER-ID 52-91

Number

Delaware River Basin

Pike County Pennsylvania Phase I Inspection Report

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL

A. Authority

The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspections of dams throughout the United States.

B. Purpose

The purpose of this inspection is to determine if the dam constitutes a hazard to human life and property.

1.2 DESCRIPTION OF PROJECT

A. Description of Dam and Appurtenances

Note: Design drawings indicate a spillway crest elevation of 962.50. The U.S.G.S. map shows a reservoir elevation of 1280.0. The U.S.G.S. elevation is used in this report as top of spillway crest.

McConnell Lake Dam is a 500 foot long earthfill structure with a maximum height of 16 feet. The dam embankment is located close to and its slopes intersect with the fill of the adjacent State Highway Route No. 739. The concrete ogee spillway is located near the center of the dam embankment where the dam reaches its maximum height. The spillway design crest is four feet below the design elevation of the dam and is 45 feet long. The discharge channel is a U-shaped concrete channel which ties into the wingwalls of the State Highway bridge which crosses the spillway outlet channel. A valve chamber was constructed in the left forebay wingwall. Five valves are located in the upstream wall and discharge through a 24-inch pipe into the spillway channel.

411005

B. Location: Blooming Grove Township, Pike County
U.S.G.S. Quadrangle - Pecks Pond, Pa.
Latitude 41°-20.6', Longitude 75°-02.3'
Appendix E, Plates I & II

C. Size Classification: Intermediate: Height - 16 feet
Storage - 1773 acre-feet

D. Hazard Classification: Significant (Refer to Section 3.1.E.)

E. Ownership: Mr. David Kochel, Community Manager
Hemlock Farms Community Association
Hemlock Farms
Box 1007
Hawley, PA 18428

F. Purpose: Recreation

G. Design and Construction History

The first dam on this site was constructed around 1872. This dam was rebuilt and raised in 1931. This raising increased the flowline by two feet. The 1931 dam had a length of about 340 feet. A concrete wall, having a length of about 160 feet and supported by fill on both sides, functioned as the overflow section. The 1931 dam was breached in 1947 for construction of an airstrip in the reservoir area.

In 1952 plans were prepared by Mr. R.N. Dentz of George M. Brewster & Sons, Inc., for construction of a new dam. The State Highway bridge was built in 1953 and a permit for construction of the dam was issued on July 9, 1957. Construction by the Design-Construction Company started on June 1, 1957, and was completed in September, 1957.

H. Normal Operating Procedures

McConnell Lake is used for recreation purposes and the pool level is maintained at the spillway crest elevation. Inflow above this level is discharged over the spillway.

1.3 PERTINENT DATA

A. Drainage Area (square miles)

From files:	2.3
Computed for this report:	2.3
Use:	2.3

B. Discharge at Dam Site (cubic feet per second)
See Appendix D for hydraulic calculations

Maximum known flood	175
Outlet works low-pool outlet at pool Elev. 1275	14
Outlet works at pool level Elev. 1280.0 (spillway crest)	22
Spillway capacity at pool Elev. 1283.1 (surveyed low point of dam)	953
Spillway capacity at pool Elev. 1284.0 (design crest elevation)	1397
Spillway capacity at pool Elev. 1284.6 (top of spillway walls)	1723

C. Elevation (feet above mean sea level)

Top of dam (low point as surveyed)	1283.1
Top of dam (design)	1284.0
Top of spillway walls	1284.6
Spillway crest	1280.0
Upstream portal invert (invert 24-inch pipe)	1267.5
Downstream portal invert	1267.5
Streambed at centerline of dam - estimate	1268.0

D. Reservoir (miles)

Length of normal pool	1.1
Length of maximum pool	1.1

E. Storage (acre-feet)

Spillway crest (Elev. 1280.0)	1437
Top of dam (Elev. 1283.1)	1773

F. Reservoir Surface (acres)

Top of dam (Elev. 1283.1)	121
Spillway crest (Elev. 1280.0)	100

G. Dam

Refer to Plate III in Appendix E for plan and section.

Type: Zoned earthfill.

Length: 500 feet.

Height: 16 feet.

Top Width: Design - 10 feet; Surveyed - 13 feet.

Side Slopes:	Design	Surveyed
Upstream	2H to 1V	1.7H to 1V
Downstream	2H to 1V	2.9H to 1V

Zoning: Clay core shown on design drawing along centerline dam.

Cutoff: Steel sheet piling extending into clay core.

Grouting: None.

H. Outlet Facilities

There are five pipes leading into a wet well. Each pipe has a valve on the downstream side of the wet well. Only two of these valves are operable. Discharge from the wet well is through a 24" diameter pipe which discharges into the spillway channel downstream from the ogee section.

. Spillway

Type: Uncontrolled concrete ogee section.

Length of Weir: 45 feet.

Crest Elevation: 1280.

Downstream Channel: Rectangular concrete channel which tapers from 45 feet wide at the base of the ogee section to about 27 feet wide at the State Highway bridge about 100 feet downstream.

J. Regulating Outlets

See Section 1.3.H.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN

The engineering design data for McConnell Lake Dam is limited to the construction detail drawings and to hydraulic calculations for the spillway. Detailed design calculations for the embankment and spillway are not available. The design drawings are reproduced in Appendix E of this report. The hydraulic computations include routing of the inflow through the reservoir. The maximum design discharge was 1395 cfs. The capacity of the waterway opening under the highway bridge is given as 2760 cfs.

2.2 CONSTRUCTION

The available construction data is limited to letters indicating the percentage of completion of major work items on a bi-weekly basis. These letters cover the period from June 1, 1957, to September 1, 1957. At the latter date, all major items were completed except seeding, rock facing and clearing. Records of pile driving, sheet pile length, fill compaction and foundation inspection are not available. Some construction photographs indicate that sheet piling was installed over a length of about 20 feet on the left side of the spillway and approximately 200 feet on the right side of the spillway.

2.3 OPERATION

Formal records of operation have not been maintained by the owner.

2.4 EVALUATION

A. Availability

The construction drawings, some construction photographs, hydraulic calculations and construction progress report are available in the files of Pennsylvania Department of Environmental Resources (PennDER).

B. Adequacy

The construction drawings, combined with the visual inspection of the dam and its appurtenant structures are considered adequate for making a reasonable assessment of the condition of the dam.

C. Operating Records

Operating records, including maximum pool levels have not been maintained by the owner.

D. Post Construction Changes

Records of modifications made to the facilities are not available. The visual inspection indicates that the dam was constructed on a nearly tangent line, rather than the curved alignment shown on Plate III, Appendix E. This has been a construction modification rather than a post construction change.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS

A. General

The general appearance of McConnell Lake Dam is fair. The embankment is rather short and has a small horizontal curve at the east end. State Highway Route No. 739 is located about 110 feet downstream from the spillway. The reservoir is used for recreation. A private beach area is located to the east of the dam. A cyclone fence has been constructed on the top of the dam to prevent the public use of the facilities.

The embankment appears to be in good condition. There was no evidence of seepage or sloughs. The spillway consists of a concrete ogee section and is located near the center of the embankment length. The concrete ogee section and spillway walls are in good condition.

The visual inspection check list and sketches of the general plan and profile of the dam, as surveyed during this inspection, are presented in Appendix A of this report. Mr. Thomas Clauss, representative of the owners, accompanied the inspectors during the visual inspection of the facilities.

Photographs taken during the inspection are reproduced in Appendix C of this report.

B. Embankment

The upstream slope is in fair condition. Good riprap protection is on the upstream slope to prevent damage from wave action. Some heavy brush and small trees are growing on this slope.

The breast of the dam has a good cover of grass. A cyclone fence is located along the downstream edge of the crest. The downstream slope is adequate and there were no signs of seepage or sloughage. This slope is covered with brush. The toe of the slope is close to the fill of State Highway Route No. 739 and at the right end of the embankment; the highway is higher in elevation than the dam crest elevation. A swale is located in this area between the highway and the dam. Highway drainage is collected in drop inlets located on both sides of the spillway and the runoff is discharged in the spillway outlet channel.

The embankment is on a slightly curved alignment at the right end. The profile (Plate A-II, Appendix A) indicates a low area adjacent to the right of the right spillway. The low area near the right abutment

is of no consequence, because the highway and swale are above dam crest elevation and thus would prevent overtopping at this point.

C. Appurtenant Structures

The spillway is located near the center of the embankment length where the fill height is a maximum. The spillway consists of a concrete ogee section between vertical abutment walls. The concrete of the ogee section appeared to be in good condition. The abutment walls had some minor cracks. Some seepage through these cracks was in evidence, although the downstream slope was dry. A valve chamber was constructed as a part of the left spillway abutment wall. Access to the chamber is through a manhole. In the chamber are five valves located against the upstream wall. These valves are closely clustered together (Plate VII, Appendix E). Only the two upper valves have operator's wheels. These wheels are located below the steel platform (Plate VII, Appendix E), rather than extending above the platform. Operation of the wheels would require lying on the platform in order to reach the valve controls. The platform did not appear to be adequate to provide firm support for the operator. The water entering the well is discharged through a 24-inch outlet pipe leading to the spillway discharge channel. Some of the valves were last operated in 1972 or 1973. They appeared to be in good condition.

The spillway discharge channel is a U-shaped channel with concrete walls and slab. The concrete was in good condition. A steel beam highway bridge crosses the discharge channel about 110 feet downstream from the ogee section (Photograph No. 5).

D. Reservoir Area

The reservoir is surrounded by a residential development. The reservoir banks and the drainage area are wooded with moderate slopes. The banks appear to be stable and major siltation is not expected.

E. Downstream Channel

The downstream channel is crossed by the State Highway Route No. 739 bridge immediately downstream of the dam. No homes are located in the flooplain of McConnell Creek. One and one-half miles downstream from the dam the creek joins the Shohola Creek which runs through an uninhabited area over at least 4.5 miles. The proximity of the highway to the dam creates a potential hazard to loss of life at this location if the dam fails. The hazard classification for McConnell Dam is therefore considered to be "Significant."

3.2 EVALUATION

The visual inspection of McConnell Lake Dam indicates that the dam and its facilities are in fair condition. Maintenance procedures should be improved (See Section 4).

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES

McConnell Lake Dam is a privately owned reservoir and dam used for recreational purposes. The reservoir level is maintained at spillway crest elevation and all inflow is discharged through the spillway. There are no procedures for maintenance or regular operation of the drawdown facilities.

4.2 MAINTENANCE OF DAM

The embankment is not mowed. Brush and trees have been permitted to grow on the slopes. Some settlement of the fill adjacent to the right spillway wall has occurred.

4.3 MAINTENANCE OF OPERATING FACILITIES

The operating facilities for this dam consist of five valves located in a valve chamber adjacent to the left wingwall of the spillway. The valves are not operated or greased on a regular basis. The reservoir was last lowered in 1972 or 1973 by opening one or more of these valves.

4.4 WARNING SYSTEM

There is no formal surveillance plan or downstream warning system at the present time.

4.5 EVALUATION

The overall operational and maintenance procedures for McConnell Lake Dam are limited and require additional attention. It is recommended that all brush and trees on the embankment be removed and that this be repeated on a regular basis. The valves should be greased and operated at least once each year.

Plans for surveillance of the facilities and a downstream warning system should be developed for use during periods of heavy or prolonged precipitation.

SECTION 5 - HYDROLOGY/HYDRAULICS

5.1 EVALUATION OF FEATURES

A. Design Data

The files contained no stage-discharge curve or stage-storage curve. The files contain copies of the designer's computations for routing of the design hydrograph through the reservoir. The design storm hydrograph was based on the maximum known storm in the area (1942).

Since the design flood was not the Probable Maximum Flood (PMF), computations are shown in Appendix D to evaluate the routing of a PMF through this project.

B. Experience Data

There are no records of flood levels at McConnell Lake Dam. It was reported that the maximum known flood since construction of the dam occurred in 1972. At that time, the pool reached a level about one foot higher than the spillway crest. This flood was passed without difficulty.

C. Visual Observations

On the date of the inspection, no conditions were observed that would indicate that the appurtenant structures of the dam could not operate satisfactorily during a flood event until the dam is overtopped. It was noted, however, that three of the five valves in the wet well were inoperable. This does not affect the spillway discharge capacity.

D. Overtopping Potential

McConnell Lake Dam has a total storage capacity of 1773 acre-feet and the overall height is 16 feet above the streambed. These dimensions indicate a size classification of "Intermediate." The hazard classification for this dam is "Significant" (See Section 3.1.E.).

The Spillway Design Flood (SDF) for a dam having the above classifications should be in the range of one-half the PMF to the full PMF. Since the downstream area is not populated, the recommended SDF for this dam is one-half the PMF. For this dam the SDF peak inflow is 2688 cfs (See Appendix D for hydraulic calculations).

Comparison of the estimated SDF peak inflow of 2688 cfs with the estimated total discharge capacity of 953 cfs indicates that a potential for overtopping of the McConnell Lake dam exists.

An estimate of the storage effect of the reservoir and routing of the computed inflow hydrograph through the reservoir shows that this dam does not have the necessary storage available to pass the SDF without overtopping. The spillway-reservoir system can pass a flood event equal to 29% of a PMF, based on the present low point in the crest profile. If the low areas would be eliminated and the crest made uniform at the elevation of the top of the spillway walls, the project would pass 50% of a PMF without overtopping. If the crest would be made uniform at the design elevation, the project would pass 41% of a PMF without overtopping.

E. Spillway Adequacy

The intermediate size and significant hazard categories, in accordance with the Corps of Engineers criteria and guidelines, indicates that the SDF for this dam should be in the range of one-half PMF to the full PMF. The recommended SDF is one-half PMF.

Calculations show that the total spillway discharge capacity and reservoir storage capacity, based on the present low point of the dam profile, combine to handle 29% of the PMF (Refer to Appendix D).

Since the total spillway discharge and reservoir storage capacity cannot pass the SDF without overtopping, and since the dam is not classified as high hazard, the spillway is considered to be inadequate but not seriously inadequate.

The hydrologic analysis for this investigation was based upon existing conditions of the watershed. The effects of future development were not considered.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY

A. Visual Observations

1. Embankment

The visual inspection of McConnell Lake Dam did not detect any signs of embankment instability. The field survey indicates that the upstream slope above normal pool is 1.7H to 1V, instead of the deisgn slope of 2H to 1V. This slope is considered to be steep; however, good riprap protection is provided. The downstream slope is flatter than the design slope and the crest is wider. The surveyed profile of the dam (Plate A-II, Appendix A) indicates several areas below design crest elevation. The crest of the dam is low at the right end, but overtopping is prevented due to the presence of a higher roadway embankment.

2. Appurtenant Structures

The concrete ogee section appeared to be in good condition with no signs of deterioration of the concrete. The abutment walls had some minor cracking (Photographs No. 1 and No. 4). There was, however, no movement or deflection and the cracking is not considered to be serious at the present time.

The discharge channel was also in good condition and is tied-in by a uniform transition into the bridge wingwalls. The valve chamber did not show any leakage; and although the valves were not operated, they appeared to be in reasonably good condition.

B. Design and Construction Data

1. Embankment

The design drawings indicate an option for the cutoff beneath the embankment. The depth of the cutoff is variable and was specified to be either an impervious earth core trench or AP-3 sheeting. Construction photographs in the PennDER file show sheeting in-place. There are no records of the actual extent to which a clay core and/or sheeting was used. Indications are, from construction reports, that the sheeting was used on both sides of the spillway.

A one foot thickness of riprap protects the upstream slope. Toe drains are not indicated.

2. Appurtenant Structures

The ogee spillway and wingwalls are founded on a 1.5 foot thick slab which is shown to be supported on 20 foot long timber piles. The maximum height of the wingwalls is 19 feet with a footing width of 8.33 feet. This width appears to be small, but there is no apparent stability problem. The abutment walls adjacent to the ogee section appear to have no footings at the right side and only a partial footing at the left side. This condition could contribute to some of the observed cracking.

The ogee is supported on piles. A stress diagram, shown on Plate VI, indicates that the resultant falls within the middle third of the section without considering uplift. The sheet pile wall and the two feet of gravel base under the slab decreases the amount of uplift. The valve chamber located at the upstream left wingwall has an uplift force about equal to the weight of concrete, not including the additional weight of wingwall and wingwall footing. Flotation apparently is not a problem.

All the concrete was to be reinforced (Note 3, Plate IV). However, the reinforcement is not detailed and cannot be evaluated. The visual inspection did not indicate any problems of instability or undue stress aside from the noted slight cracking. Wall movements were not detected and the general condition of the concrete was good. It appears, therefore, that the design was adequate.

C. Operating Records

Operating records for this dam have not been maintained.

D. Post Construction Changes

There are no indications or records of changes made to the facilities since the construction was completed in 1957.

E. Seismic Stability

This dam is located in Seismic Zone 1 and it is considered that the static stability is sufficient to withstand minor earthquake-induced dynamic forces. No studies or calculations have been made to confirm this assumption.

SECTION 7 - ASSESSMENT AND RECOMMENDATIONS

7.1 DAM ASSESSMENT

A. Safety

The visual inspection and the review of the construction drawings indicate that McConnell Lake Dam is in fair condition. The field inspection did not detect any signs of instability or seepage that could be considered to endanger the safety of the dam.

The hydrologic and hydraulic computations indicate that the combination of storage capacity and the discharge of the spillway are able to handle 29 percent of the Probable Maximum Flood (PMF). The spillway is not capable of passing the Spillway Design Flood (SDF) and is therefore considered to be inadequate, but not seriously inadequate.

B. Adequacy of Information

The design and construction information contained in the files of PennDER are considered adequate for making a reasonable assessment of this dam. The conclusions reached, that this dam is adequately designed and constructed, is supported by the visual appearance of the entire facility.

C. Urgency

The recommendations presented below should be implemented immediately.

D. Additional Studies

A detailed hydrologic and hydraulic analysis should be performed by a professional engineer, experienced in the design and construction of dams, to determine means for improving the capacity of the spillway.

7.2 RECOMMENDATIONS

In order to assure the continued satisfactory operation of this dam, the following recommendations are presented to the owner for immediate implementation:

1. That a detailed hydrologic and hydraulic engineering analysis be made by a professional engineer with experience in the design and construction of dams to determine means for improving the capacity of the spillway and reservoir system so that it will meet the requirements of the Commonwealth of Pennsylvania.

2. That all brush and trees be removed from the embankment slopes and that this maintenance be repeated on a regular basis.

3. That at least the two top valves be greased and operated on an annual basis.

4. That a formal surveillance plan and downstream warning system be developed for implementation during periods of high or prolonged precipitation.

5. That an operation and maintenance manual be prepared for guidance in the operation of the dam during normal and emergency conditions, and that a schedule be developed for the annual inspection of the dam and its appurtenant structures.

APPENDIX A

CHECKLIST OF VISUAL INSPECTION REPORT

CHECK LIST

PHASE I - VISUAL INSPECTION REPORT

PA DER # 52-91 NDI NO. PA-00 398

NAME OF DAM McConnell Lake Dam HAZARD CATEGORY Significant

TYPE OF DAM Earthfill

LOCATION Blooming Grove TOWNSHIP Pike COUNTY, PENNSYLVANIA

INSPECTION DATE 4/2/80 WEATHER cloudy-cold TEMPERATURE 30-40

INSPECTORS: R. Houseal (Recorder) OWNER'S REPRESENTATIVE(s):

H. Jongsma Thomas K. Clauss

R. Shireman

A. Bartlett

NORMAL POOL ELEVATION: 1280 (U.S.G.S.) AT TIME OF INSPECTION:
Spillway + 1"

BREAST ELEVATION: 1284 (Design) POOL ELEVATION: 1280.1

SPILLWAY ELEVATION: 1280 TAILWATER ELEVATION:

MAXIMUM RECORDED POOL ELEVATION: 1281±

GENERAL COMMENTS:

This embankment is low and is close to and paralleling the highway. Chain link security fence prevents public entrance into or use of this lake.

Facility appears to be in fair condition.

NDI NO. PA-00 398

VISUAL INSPECTION
EMBANKMENT

	OBSERVATIONS AND REMARKS
A. SURFACE CRACKS	None evident.
B. UNUSUAL MOVEMENT BEYOND TOE	None evident.
C. SLOUGHING OR EROSION OF EMBANKMENT OR ABUTMENT SLOPES	None evident.
D. ALIGNMENT OF CREST: HORIZONTAL: VERTICAL:	Horizontal - Slightly curved. Vertical - Refer to Profile (Plate A-II).
E. RIPRAP FAILURES	None evident.
F. JUNCTION EMBANKMENT & ABUTMENT OR SPILLWAY	All abutments sound. Some slight erosion behind spillway walls on upstream side, but the areas are portected by slab rocks. There is a low area at the right spillway abutment wall.
G. SEEPAGE	None observed.
H. DRAINS	None located.
J. GAGES & RECORDER	None.
K. COVER (GROWTH)	Upstream - Riprap, some weeds and brush. Top - Grass and weeds. Downstream - Weeds, brush and some small (2"-3") trees.

NDI NO. PA-00 398

VISUAL INSPECTION
OUTLET WORKS

	OBSERVATIONS AND REMARKS
A. INTAKE STRUCTURE	Valve pit access through top. Five valves. Pit is adjacent to left spillway wall and draws water directly from the reservoir.
B. OUTLET STRUCTURE	24" - Ø pipe from valve pit exiting through spillway outlet channel wall (left side).
C. OUTLET CHANNEL	Spillway outlet channel with concrete slab and walls.
D. GATES	5 valves.
E. EMERGENCY GATE	Same as D. above.
F. OPERATION & CONTROL	Last opened for drawdown in 1972 or 1973.
G. BRIDGE (ACCESS)	None.

NDI NO. PA-00 398

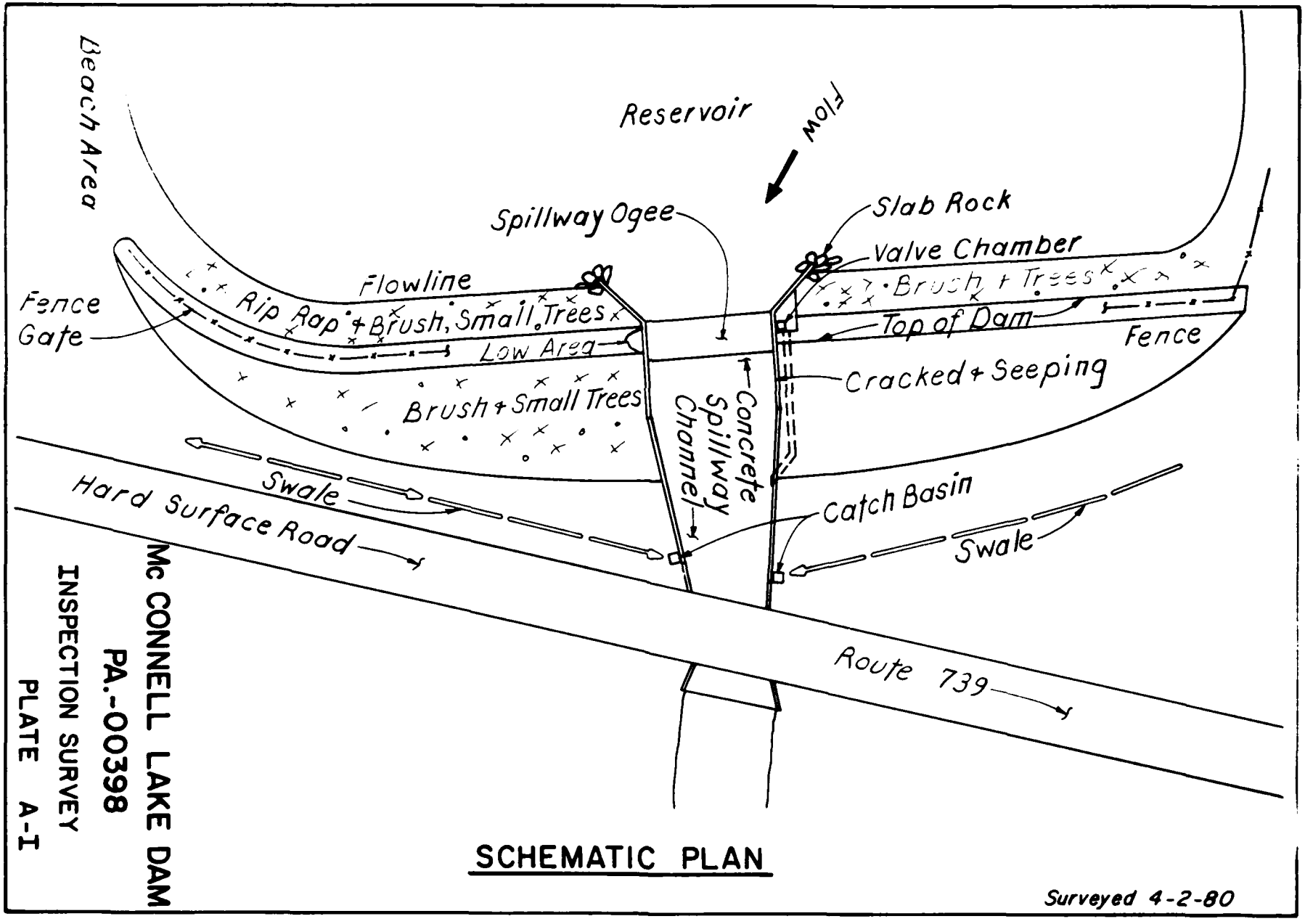
VISUAL INSPECTION
SPILLWAY

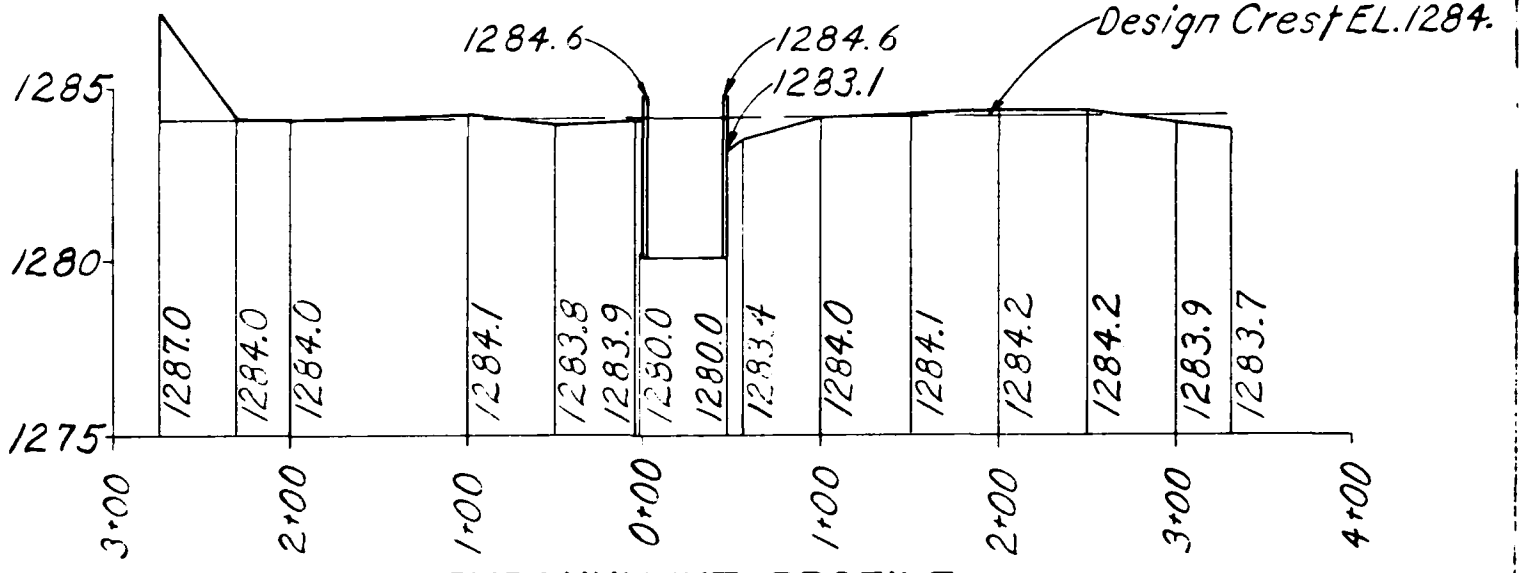
	OBSERVATIONS AND REMARKS
A. APPROACH CHANNEL	Approach to spillway is directly from the reservoir near the center of the embankment. Area is unobstructed.
B. WEIR: Crest Condition Cracks Deterioration Foundation Abutments	Ogee section in good condition. Walls are plumb and also in good physical condition. A wet area was noted on the left wall about 8'± from the top. Some vertical cracking in abutment walls due to unequal stresses.
C. DISCHARGE CHANNEL: Lining Cracks Stilling Basin	Discharge channel is a concrete U-section with a concrete bottom slab. This channel appears to extend beneath the roadway bridge beyond which the channel becomes the natural channel. Several highway drainage pipes extend through the channel wall.
D. BRIDGE & PIERS	None, except the highway bridge 110 feet downstream of ogee section.
E. GATES & OPERATION EQUIPMENT	None.
F. CONTROL & HISTORY	None, maximum flow estimated at 12 inches over ogee section during Agnes (1972).

NDI NO. PA-00398

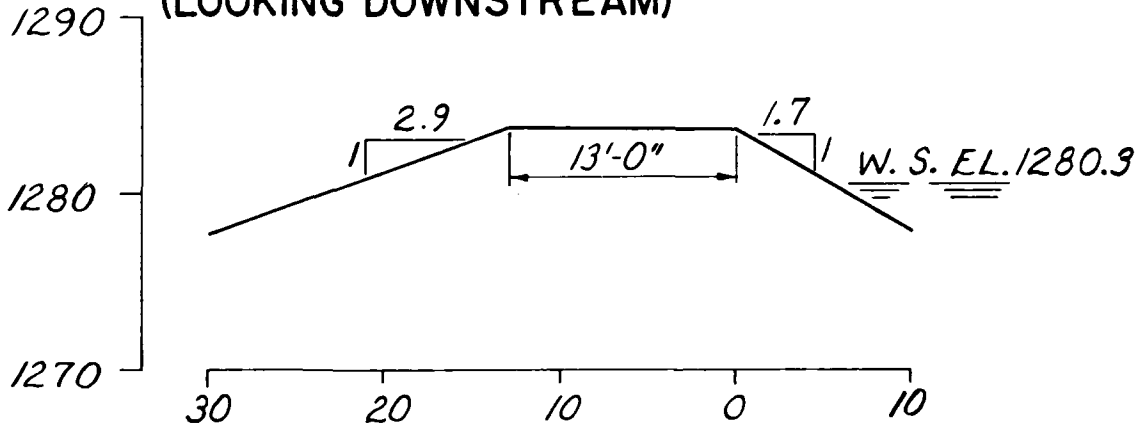
VISUAL INSPECTION

	OBSERVATIONS AND REMARKS
INSTRUMENTATION Monumentation	None.
Observation Wells	None.
Weirs	None.
Piezometers	None.
Staff Gauge	None.
Other	None.
RESERVOIR Slopes	Wooded. 10°-20° slope angle. Some cottages near lake's edge.
Sedimentation	None reported.
Watershed Description	Lightly wooded residential development.
DOWNSTREAM CHANNEL Condition	Stream has grassed banks with some trees and brush. Stream bottom is sandy.
Slopes	10°-20° beyond flat floodplain.
Approximate Population	State Highway Route 739 and bridge immediately downstream of dam.
No. Homes	No houses located in the first 2 miles where McConnell Creek joins Shohola Creek.


Beach Area
Reservoir
Flow
Spillway Ogee
Slab Rock
Valve Chamber
Flowline
Brush + Trees
Fence
Gate
Rip Rap + Brush, Small Trees
Top of Dam
Fence
Low Area
Cracked + Seeping
Brush + Small Trees
Concrete Spillway Channel
Swale
Catch Basin
Hard Surface Road
Swale
Route 739
Mc CONNELL LAKE DAM
PA.-00398
INSPECTION SURVEY
PLATE A-I
SCHEMATIC PLAN
Surveyed 4-2-80



EMBANKMENT PROFILE
(LOOKING DOWNSTREAM)



EMBANKMENT SECTION
STA. 0+25

Surveyed 4-2-80

McCONNELL LAKE DAM
PA.-00398
INSPECTION SURVEY
PLATE A-II

APPENDIX B

CHECKLIST OF ENGINEERING DATA

CHECK LIST
ENGINEERING DATA

PA DER # 52-91 NDI NO. PA-00398

NAME OF DAM McCONNELL LAKE DAM

ITEM	REMARKS
AS-BUILT DRAWINGS	Not available.
REGIONAL VICINITY MAP	U.S.G.S. Quadrangle - Pecks Pond, Pa. See Plate II, Appendix E
CONSTRUCTION HISTORY	Constructed in 1957 by Geo. Brewster & Son, Inc. Started June 1, 1957. Completed September, 1957.
GENERAL PLAN OF DAM	Plate III, Appendix E. Note: Alignment of dam appears to be straight. See Plate A-I, Appendix A.
TYPICAL SECTIONS OF DAM	Plate III, Appendix E.
OUTLETS: PLAN DETAILS CONSTRAINTS DISCHARGE RATINGS	Plate V, Appendix E. Plates VI & VII, Appendix E. Hydraulic calculations in PennDER files.

NDI NO. PA-00 398

ENGINEERING DATA

ITEM	REMARKS
RAINFALL & RESERVOIR RECORDS	No records.
DESIGN REPORTS	None.
GEOLOGY REPORTS	None.
DESIGN COMPUTATIONS: HYDROLOGY & HYDRAULICS DAM STABILITY SEEPAGE STUDIES	In PennDER files prepared by design engineer. None. None.
MATERIALS INVESTIGATIONS: BORING RECORDS LABORATORY FIELD	Plate III, Appendix E. No records. No records.
POST CONSTRUCTION SURVEYS OF DAM	None.
BORROW SOURCES	Unknown.

NDI NO. PA-00 398

ENGINEERING DATA

ITEM	REMARKS
MONITORING SYSTEMS	None.
MODIFICATIONS	Crest alignment was made on a tangent, with slight curve at right end.
HIGH POOL RECORDS	No records. Estimated at one foot over spillway (June 1972).
POST CONSTRUCTION ENGINEERING STUDIES & REPORTS	None.
PRIOR ACCIDENTS OR FAILURE OF DAM Description: Reports:	A dam reconstructed on the site in 1932 was dynamited in fall of 1932 by unknown person(s). Repaired in 1933. None to existing dam.
MAINTENANCE & OPERATION RECORDS	No records.
SPILLWAY PLAN, SECTIONS AND DETAILS	Plates III - VII, Appendix E.

NDI NO. PA-00398

ENGINEERING DATA

ITEM	REMARKS
OPERATING EQUIPMENT, PLANS & DETAILS	Five valves in left spillway wall. Plate VII, Appendix E.
CONSTRUCTION RECORDS	Bi-weekly percentage progress reports in PennDER files.
PREVIOUS INSPECTION REPORTS & DEFICIENCIES	One PennDER Inspection Report in 1965.
MISCELLANEOUS	

NDI NO. PA-00 398

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: wooded with recreational development

ELEVATION:

TOP NORMAL POOL & STORAGE CAPACITY: Elev. 1280 Acre-Feet 1437

TOP FLOOD CONTROL POOL & STORAGE CAPACITY: Elev.1283.1 Acre-Feet 1773

MAXIMUM DESIGN POOL: Elev. 1284

TOP DAM: Elev. 1283.1

SPILLWAY:

a. Elevation 1280

b. Type ogee section

c. Width 45'

d. Length --

e. Location Spillover near center of dam

f. Number and Type of Gates none

OUTLET WORKS:

a. Type 2-12" valves in wet well

b. Location adjacent to left side of spillway

c. Entrance inverts 1271.1

d. Exit inverts 1267.5

e. Emergency drawdown facilities 2-12" valves

HYDROMETEOROLOGICAL GAGES:

a. Type none

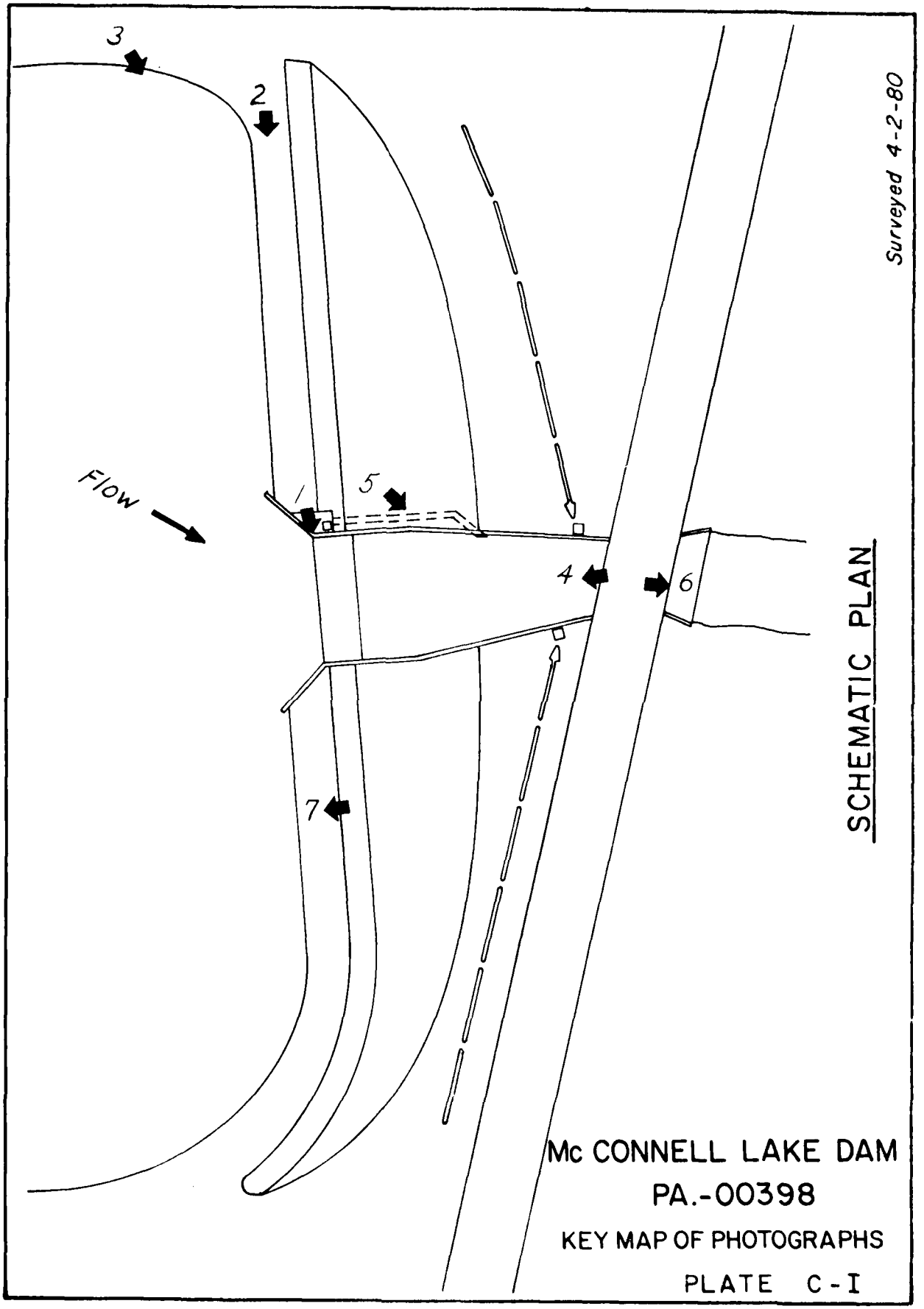
b. Location

c. Records

MAXIMUM NON-DAMAGING DISCHARGE: 953 cfs

APPENDIX C

PHOTOGRAPHS

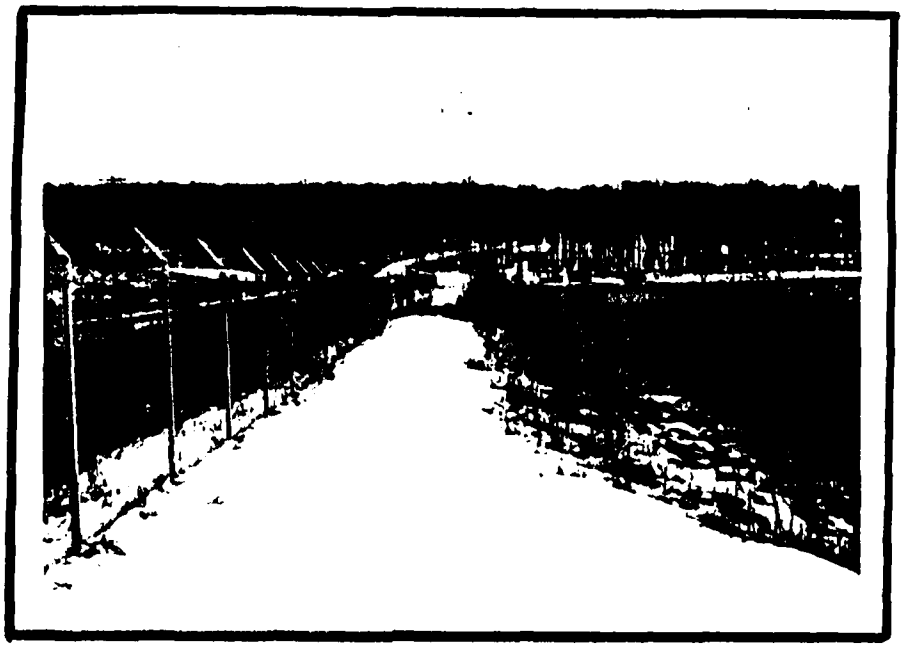


Mc CONNELL LAKE DAM

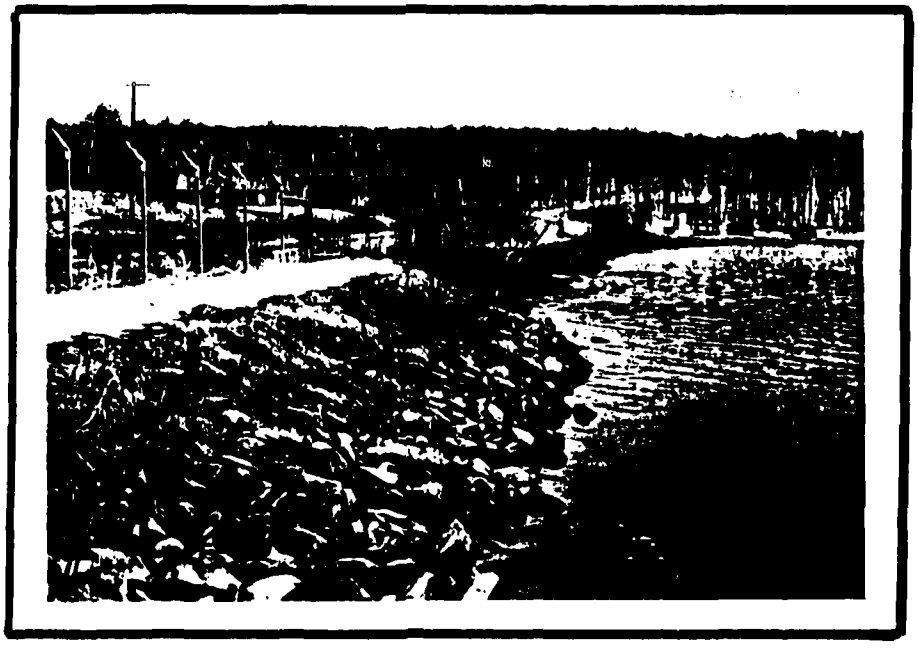
PA.-00398

KEY MAP OF PHOTOGRAPHS

PLATE C-I

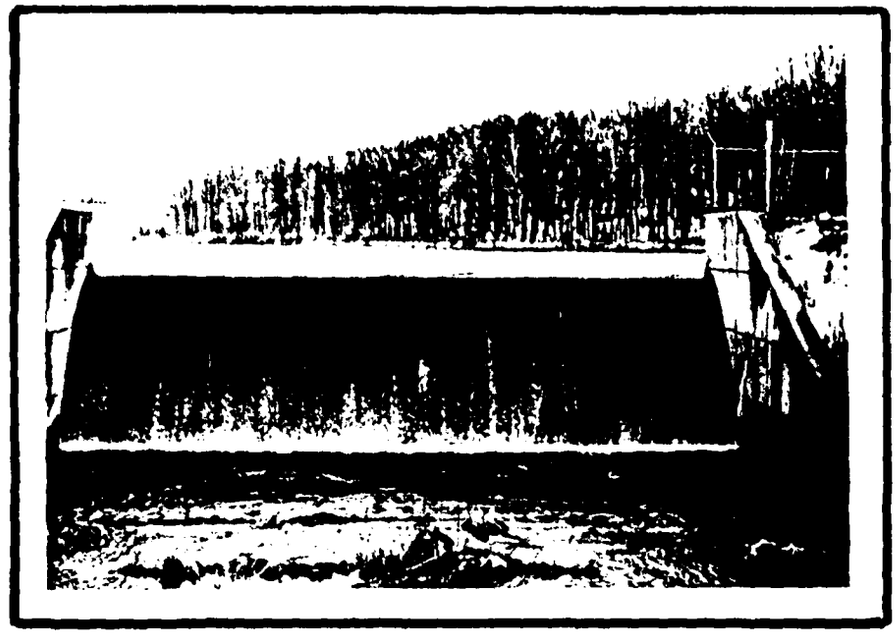


LEFT END OF EMBANKMENT - NO. 2

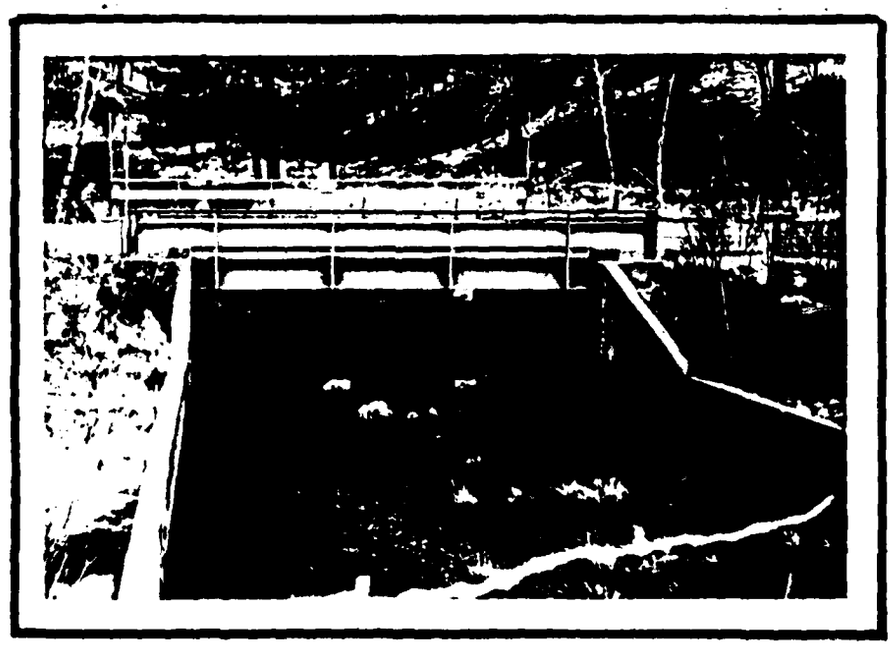


UPSTREAM SLOPE - NO. 3

PA-00398
Plate C-II



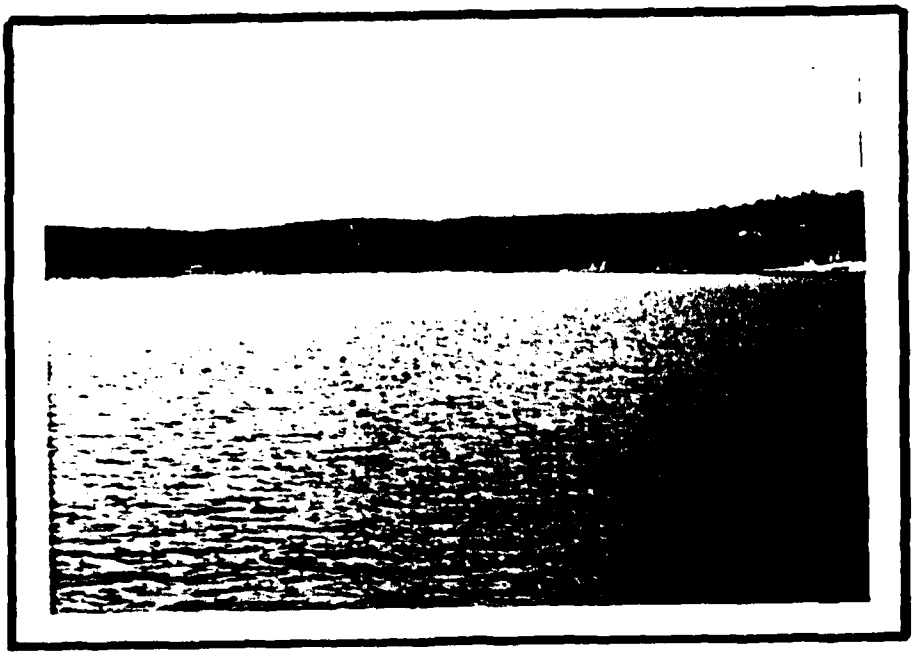
OGEE SPILLWAY - NO. 4



BRIDGE OVER CHANNEL BELOW SPILLWAY - NO. 5

PA-00398
Plate C-III

DOWNSTREAM CHANNEL - NO. 6



RESERVOIR - NO. 7

PA-00398
Plate C-IV

APPENDIX D

HYDROLOGY AND HYDRAULIC CALCULATIONS

SUMMARY DESCRIPTION
OF
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION

The hydrologic and hydraulic evaluation for this inspection report has employed computer techniques using the Corps of Engineers computer program identified as the Flood Hydrograph Package (HEC-1) Dam Safety Version.

The program has been designed to enable the user to perform two basic types of hydrologic analyses: (1) the evaluation of the overtopping potential of the dam, and (2) the capability to estimate the downstream hydrologic-hydraulic consequences resulting from assumed structural failures of the dam. A brief summary of the computation procedures typically used in the dam overtopping analysis is shown below.

- Development of an inflow hydrograph to the reservoir.
- Routing of the inflow hydrograph(s) through the reservoir to determine if the event(s) analyzed would overtop the dam.
- Routing of the outflow hydrograph(s) of the reservoir to desired downstream locations. The results provide the peak discharge and maximum stage of each routed hydrograph at the outlet of the reach.

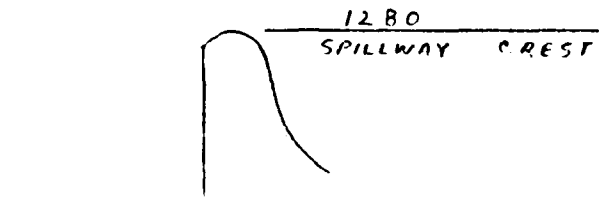
The output data provided by this program permits the comparison of downstream conditions just prior to a breach failure with that after a breach failure and the determination as to whether or not there is a significant increase in the hazard to loss of life as a result of such a failure.

The results of the studies conducted for this report are presented in Section 5.

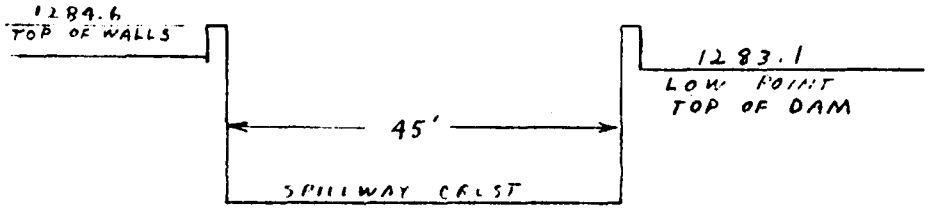
For detailed information regarding this program refer to the Users Manual for the Flood Hydrograph Package (HEC-1) Dam Safety Version prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California.

BY RLS DATE 4/20/80 **BERGER ASSOCIATES** SHEET NO. 1 OF 7
CHKD. BY DATE PROJECT D9650
SUBJECT McCONNELL LAKE

SPILLWAY RATING



OGEE SECTION $C = 3.88$ (SMALL DAMS FIG 299)



$$Q = C L H^{3/2}$$

$$H = 1283.1 - 1280 = 3.1'$$

$$Q = 3.88 \times 45 \times (3.1)^{1.5}$$

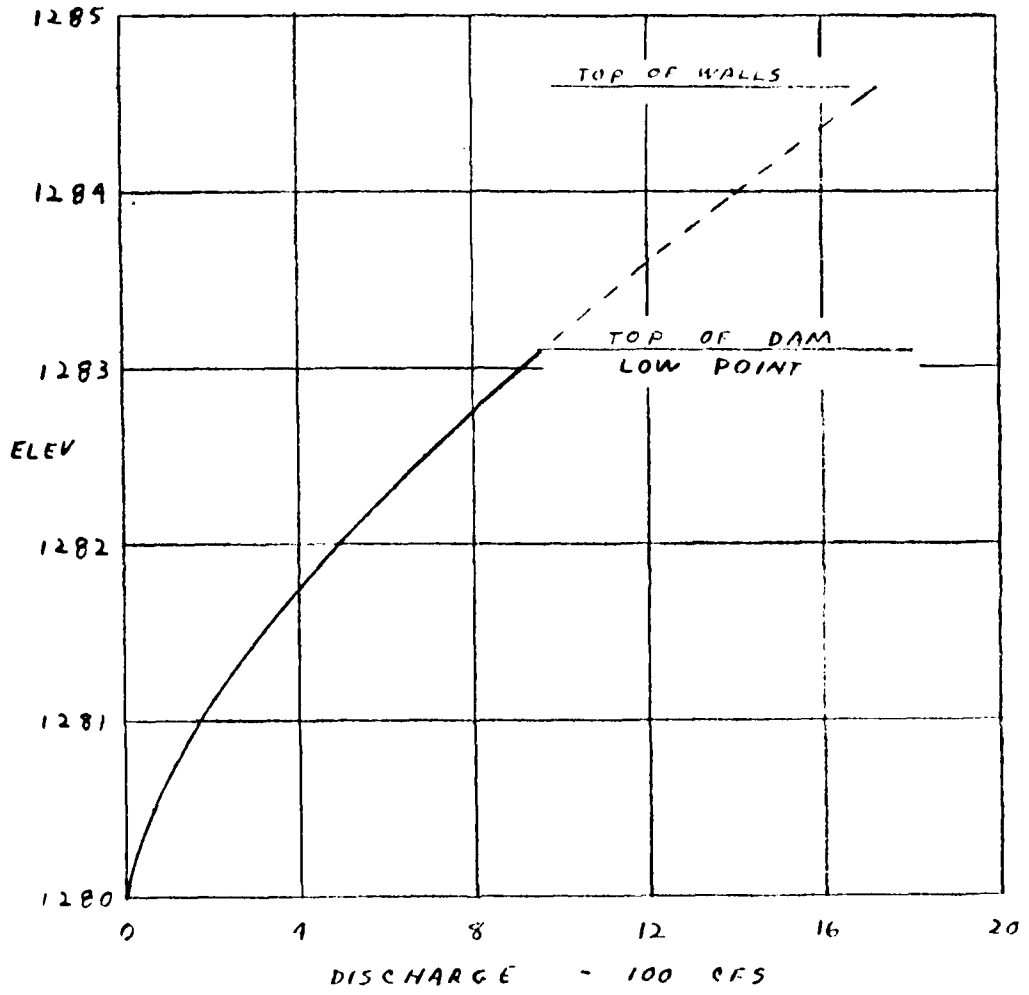
$$= 953 \text{ CFS}$$

BY RLS DATE 7/1/80 **BERGER ASSOCIATES** SHEET NO. 2 OF 7

CHKD. BY ____ DATE ____ PROJECT D9650

SUBJECT McCONNELL LAKE

SPILLWAY RATING CURVE



BY RLS DATE 5/11/82 **BERGER ASSOCIATES** SHEET NO. 5 OF 7
CHKD. BY DATE PROJECT D9650
SUBJECT McCONNELL LAKE

DISCHARGE THRU OUTLET WORKS

5 INLET PIPES TO WET WELL
EACH CONTROLLED BY A VALVE IN THE WET WELL

ONLY 2 - 12" VALVES USABLE.

INVERT = 1271.1 C = 0.6

$Q = CA\sqrt{2gH}$

AT NORMAL POOL ELEV 1280

$H = 1280 - 1271.6 = 8.4'$

$Q = 0.6 \times \pi \times (1)^2/4 \times (2 \times 32.2 \times 8.4)^{0.5} \times 2$

$= 22$ CFS

AT LOW POOL ELEV 1275

$H = 1275 - 1271.6 = 3.4'$

$Q = 0.6 \times \pi \times (1)^2/4 \times (2 \times 32.2 \times 3.4)^{0.5} \times 2$

$= 14$ CFS

BY RLS DATE 5/11/80 **BERGER ASSOCIATES** SHEET NO. 4 OF 7
CHKD. BY DATE PROJECT 09650
SUBJECT MCCONNELL LAKE

LIA BANKMENT RATING

$Q = C L H^{3/2}$ $C = 2.7$ (KING'S HDBK)

AT ELEV. 1284

$2.7 \times 7 \times (.75)^{1.5} = 12$
$2.7 \times 47 \times (.3)^{1.5} = 21$
$2.7 \times 17 \times (.05)^{1.5} = 1$
$2.7 \times 30 \times (.2)^{1.5} = 7$
$2.7 \times 33 \times (.1)^{1.5} = 3$
$2.7 \times 50 \times (.15)^{1.5} = 9$
$2.7 \times 13 \times (.15)^{1.5} = 2$ $\Sigma = 54$ CFS

AT ELEV. 1284.6

$2.7 \times 7 \times (1.35)^{1.5} = 30$
$2.7 \times 47 \times (.9)^{1.5} = 107$
$2.7 \times 100 \times (.5)^{1.5} = 95$
$2.7 \times 50 \times (.4)^{1.5} = 34$
$2.7 \times 50 \times (.45)^{1.5} = 45$
$2.7 \times 33 \times (.3)^{1.5} = 47$
$2.7 \times 50 \times (.75)^{1.5} = 88$
$2.7 \times 50 \times (.65)^{1.5} = 71$
$2.7 \times 100 \times (.55)^{1.5} = 110$
$2.7 \times 30 \times (.6)^{1.5} = 38$
$2.7 \times 9 \times (.3)^{1.5} = 4$
$2.7 \times 33 \times (.4)^{1.5} = 31$ $\Sigma = 711$ CFS

AT ELEV. 1285.4

$2.7 \times 7 \times (2.2^5)^{1.5} = 64$
$2.7 \times 47 \times (1.8)^{1.5} = 306$
$2.7 \times 100 \times (1.4)^{1.5} = 447$
$2.7 \times 50 \times (1.3)^{1.5} = 200$
$2.7 \times 50 \times (1.45)^{1.5} = 236$
$2.7 \times 30 \times (1.6)^{1.5} = 164$
$2.7 \times 50 \times (1.6^5)^{1.5} = 286$
$2.7 \times 50 \times (1.55)^{1.5} = 261$
$2.7 \times 100 \times (1.45)^{1.5} = 471$
$2.7 \times [illegible] \times (1.5)^{1.5} = 149$
$2.7 \times 33 \times (1.75)^{1.5} = 40$
[illegible] $\Sigma = 2739$ CF

MAXIMUM KNOWN FLOOD AT DAMSITE

THE MAXIMUM KNOWN FLOOD AT McCONNELL LAKE DAM OCCURRED IN 1972. AT THAT TIME THE WATER LEVEL IN THE POOL REACHED AN ELEVATION ABOUT 1' ABOVE THE SPILLWAY CREST.

$$Q = C L H^{3/2}$$

$$= 3.88 \times 45 \times (1)^{1.5}$$

$$= 175 \text{ CFS}$$

DESIGN FLOOD

SIZE CLASSIFICATION

MAXIMUM STORAGE = 1773 ACRE FEET
MAXIMUM HEIGHT = 16 FEET
SIZE CLASSIFICATION IS "INTERMEDIATE".

HAZARD CLASSIFICATION

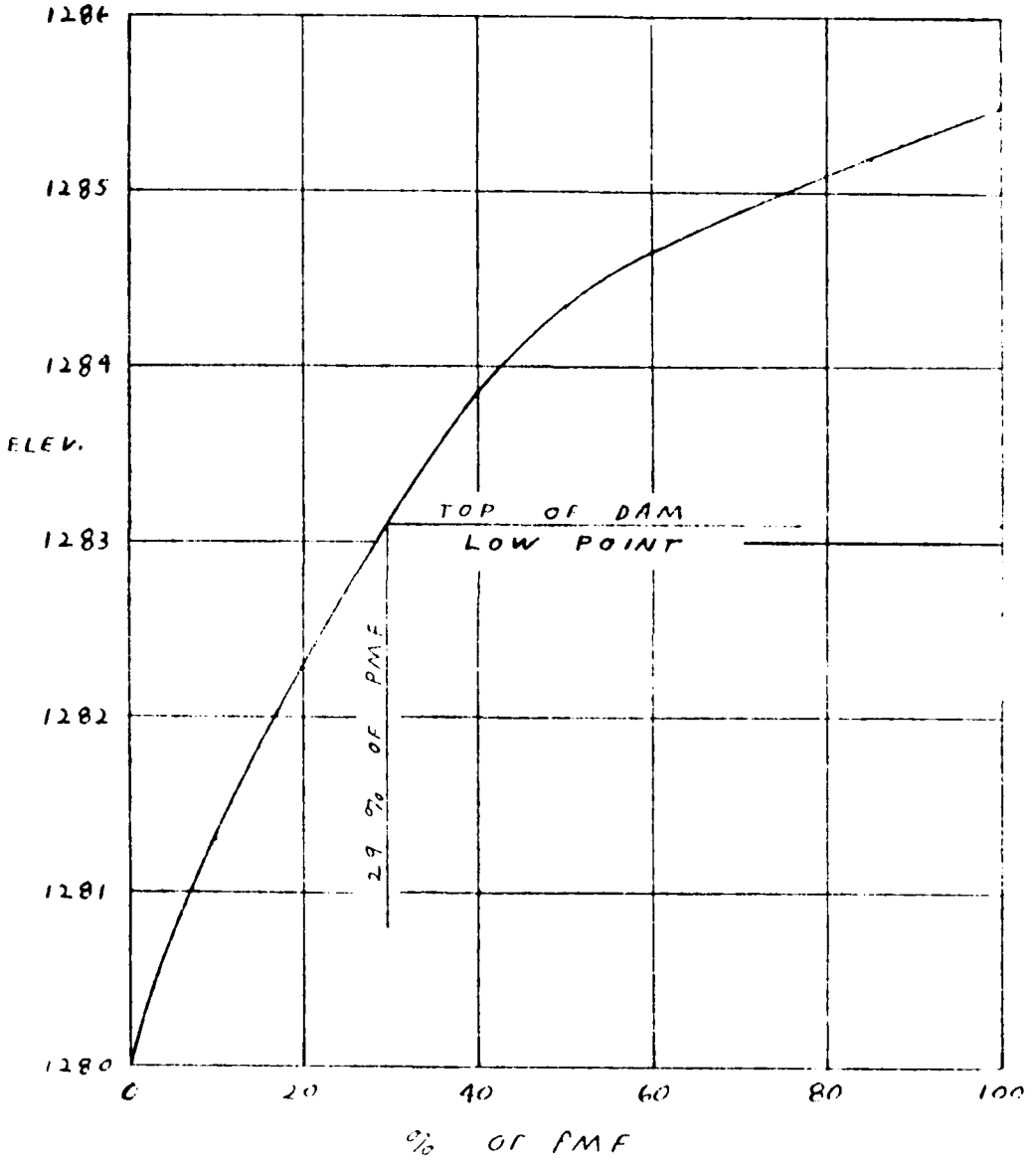
12 HOMES ARE LOCATED ALONG THE DOWNSTREAM REACH BETWEEN McCONNELL LAKE DAM AND A LARGE COAL COMPANY DAM ON HOHOLA CREEK. A STATE HIGHWAY AND AN INTERSTATE HIGHWAY CROSS THE DOWNSTREAM REACH. USE "SIGNIFICANT".

RECOMMENDED SPILLWAY DESIGN FLOOD

THE ABOVE CLASSIFICATIONS INDICATE USE OF AN SDF EQUAL TO ONE-HALF PMF TO THE PROBABLE MAXIMUM FLOOD.

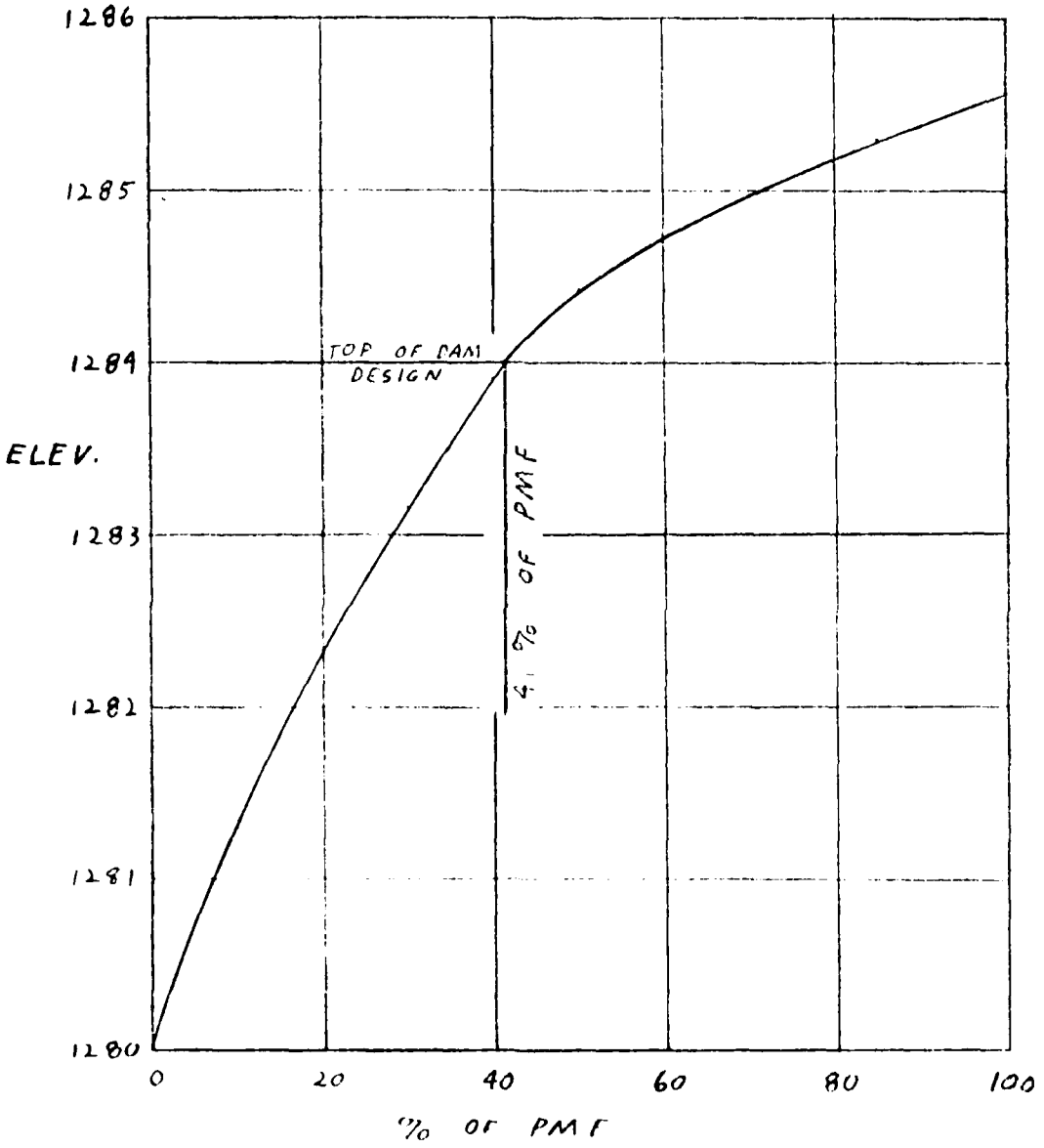
BY RLS DATE 5/1/80 **BERGER ASSOCIATES** SHEET NO. 6 OF 7
CHKD. BY DATE PROJECT D9650
SUBJECT McCONNELL LAKE

SPILLWAY CAPACITY CURVE (EXISTING)



BY RLS DATE 7/10/80 **BERGER ASSOCIATES** SHEET NO. 7 OF 7
CHKD. BY DATE PROJECT D 9650
SUBJECT McCONNELL LAKE

SPILLWAY CAPACITY CURVE (DESIGN)



HYDROLOGY AND HYDRAULIC ANALYSIS
DATA BASE

NAME OF DAM: McCONNELL LAKE _____ RIVER BASIN: DELAWARE

PROBABLE MAXIMUM PRECIPITATION (PMP) = 21.6 INCHES/24 HOURS[1]

(FOR FOOTNOTES SEE NEXT PAGE)

STATION		1	2	3	4
STATION DESCRIPTION		McConnell Lake	McConnell Lake Dam		
DRAINAGE AREA (SQUARE MILES)		2.3			
CUMULATIVE DRAINAGE AREA (SQUARE MILE)		2.3	2.3		
ADJUSTMENT OF PMP FOR DRAINAGE AREA (%)[2]	6 HOURS	111			
	12 HOURS	123			
	24 HOURS	133			
	48 HOURS	142			
	72 HOURS	---			
	Zone 1				
SNYDER HYDROGRAPH PARAMETERS	ZONE[3]	1			
	C_p / C_t[4]	0.45/1.23			
	L (MILES)[5] L^1=	1.25			
	L_{ca} (MILES)[5]				
	$T_p = C_t (L \cdot L_{ca})^{0.3}$ (hours)				
	$C_t (1.1)^{0.6}$	1.41			
SPILLWAY DATA	CREST LENGTH (FT.)		45		
	FREEBOARD (FT.)		3.1		
	DISCHARGE COEFFICIENT		3.88		
	EXPONENT		1.5		
	ELEVATION		1280		
AREA[6] (ACRES)	NORMAL POOL		100		
	ELEV. 1300		234		
	ELEV. _____				
STORAGE (ACRE-FEET)	NORMAL POOL[7]		1437		
	ELEV. 1236.9[8]		0		
	ELEV. _____[8]				
	ELEV _____[8]				

(1) Hydrometeorological Report 33 (Figure 1), U.S. Army, Corps of Engineers, 1956.

(2) Hydrometeorological Report 33 (Figure 2), U.S. Army, Corps of Engineers, 1956.

(3) Hydrological zone defined by Corps of Engineers, Baltimore District, for determining Snyder's Coefficients (C_p and C_t).

(4) Snyder's Coefficients.

(5) L = Length of longest water course from outlet to basin divide.
L_{ca} = Length of water course from outlet to point opposite the centroid of drainage area.

(6) Planimetered area encompased by contour upstream of dam.

(7) PennDER files.

(8) Computed by conic method.

FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

```
    1             A1      MCCONNELL LAKE DAM  ****  MCCONNELL CREEK
    2             A2      BLOOMING GROVE TWP., PIKE COUNTY, PA.
    3             A3      NDI # PA-00398     PA DER # 52-91
    4             B   300      0     15      0      0      0      0      0     -4      0
    5             B1    5
    6             J     1      9      1
    7             J1    1   .85    .7     .6     .5     .4     .3     .2     .1
    8             K           1                                  1
    9             K1              INFLOW HYDROGRAPH
   10             M     1      1    2.3
   11             P           21.6    111    123    133    142
   12             T                                          1    .05
   13             W  1.41    .45
   14             X  -1.5    .05      2
   15             K     1      2                              1
   16             K1              RESERVOIR ROUTING
   17             Y                            1
   18             Y1    1                                 1437     -1
   19             Y4 1280 1280.5   1281  1281.5   1282  1282.5 1283.1   1284  1284.6  1285.5
   20             Y5    0     62    175    321    494    690    953   1451   2434    4991
   21             $A    0    100    234
   22             $E1236.9   1280   1300
   23             $$ 1280
   24             $D1283.1
   25             K    99
1                          PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                                RUNOFF HYDROGRAPH AT          1
                                ROUTE HYDROGRAPH TO           2
                                END OF NETWORK
```

1**********
FLOOD HYDROGRAPH PACKAGE (HEC-1)
DAM SAFETY VERSION JULY 1978
LAST MODIFICATION 26 FEB 79
****

RUN DATE= 80/05/01.
TIME= 11.00.47.

MCCONNELL LAKE DAM **** MCCONNELL CREEK
BLOOMING GROVE TWP., PIKE COUNTY, PA.
NDI # PA-00398 PA DER # 52-91

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	15	0	0	0	0	0	-4	0
			JOPER	NWT	LROPT	TRACE			
			5	0	0	0			

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1

RTIOS= 1.00 .85 .70 .60 .50 .40 .30 .20 .10

MCCONNELL LAKE DAM **** MCCONNELL CREEK
BLOOMING GROVE TWP., PIKE COUNTY, PA.
NDI # PA-00398 PA DER # 52-91

JOB SPECIFICATION

NO	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	15	0	0	0	0	0	-4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1
RTIOS= 1.00 .85 .70 .60 .50 .40 .30 .20 .10

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.30	0.00	2.30	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.60	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 1.41 CP= .45 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= .05 RTIOR= 2.00

UNIT HYDROGRAPH 52 END-OF-PERIOD ORDINATES, LAG= 1.41 HOURS, CP= .45 VOL= 1.00

31.	114.	231.	350.	437.	470.	446.	400.	358.	321.
288.	258.	231.	207.	186.	167.	149.	134.	120.	107.
96.	86.	77.	69.	62.	56.	50.	45.	40.	36.
32.	29.	26.	23.	21.	19.	17.	15.	13.	12.
11.	10.	9.	8.	7.	6.	6.	5.	4.	4.
4.	3.								

0 END-OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q

SUM	24.54	22.15	2.39	130868.	
	(623.)	(563.)	(61.)	(3705.77)	

HYDROGRAPH ROUTING

RESERVOIR ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSKK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	1437.	-1

STAGE	1280.00	1280.50	1281.00	1281.50	1282.00	1282.50	1283.10	1284.00	1284.60	1285.5
FLOW	0.00	62.00	175.00	321.00	494.00	690.00	953.00	1451.00	2434.00	4991.0
SURFACE AREA=	0.	100.	234.							
CAPACITY=	0.	1437.	4683.							
ELEVATION=	1237.	1280.	1300.							

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1280.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1283.1	0.0	0.0	0.

PEAK OUTFLOW IS 4926. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 4121. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 3266. AT TIME 42.25 HOURS

PEAK OUTFLOW IS 2635. AT TIME 42.50 HOURS

PEAK OUTFLOW IS 2008. AT TIME 43.00 HOURS

PEAK OUTFLOW IS 1370. AT TIME 43.25 HOURS

PEAK OUTFLOW IS 967. AT TIME 43.50 HOURS

PEAK OUTFLOW IS 603. AT TIME 43.75 HOURS

PEAK OUTFLOW IS 263. AT TIME 44.00 HOURS

********** ********** ********** ********** **********

1

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

				RATIOS APPLIED TO FLOWS								
OPERATION	STATION	AREA	PLAN	RATIO 1 1.00	RATIO 2 .85	RATIO 3 .70	RATIO 4 .60	RATIO 5 .50	RATIO 6 .40	RATIO 7 .30	RATIO 8 .20	RATIO 9 .10
HYDROGRAPH AT	1	2.30	1	5377.	4570.	3764.	3226.	2688.	2151.	1613.	1075.	538.
	(	5.96)	(	152.25)(	129.41)(	106.57)(	91.35)(	76.12)(	60.90)(	45.67)(	30.45)(	15.22)
ROUTED TO	2	2.30	1	4926.	4121.	3266.	2635.	2008.	1370.	967.	603.	263.
	(	5.96)	(	139.49)(	116.70)(	92.49)(	74.62)(	56.85)(	38.80)(	27.39)(	17.08)(	7.44

1 SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1280.00	1280.00	1283.10
STORAGE	1437.	1437.	1773.
OUTFLOW	0.	0.	953.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1285.48	2.38	2068.	4926.	9.50	41.75	0.00
.85	1285.19	2.09	2031.	4121.	8.75	42.00	0.00
.70	1284.89	1.79	1992.	3266.	7.75	42.25	0.00
.60	1284.67	1.57	1964.	2635.	7.25	42.50	0.00
.50	1284.34	1.24	1922.	2008.	6.00	43.00	0.00
.40	1283.85	.75	1863.	1370.	4.75	43.25	0.00
.30	1283.13	.03	1776.	967.	.75	43.50	0.00
.20	1282.28	0.00	1679.	603.	0.00	43.75	0.00
.10	1281.30	0.00	1571.	263.	0.00	44.00	0.00

EOI ENCOUNTERED.
N>

```
  2          A2      [illegible]
  3          A3      NDI # PA-00398     PA DER # 52-91
  4          B   300      0      15       0       0       0       0       0      -4       0
  5          B1    5
  6          J     1      9       1
  7          J1    1    .85      .7      .6      .5      .4      .3      .2      .1
  8          K             1                                      1
  9          K1                 INFLOW  HYDROGRAPH
 10          M     1       1     2.3
 11          P           21.6     111     123     133     142
 12          T                                                  1     .05
 13          W  1.41     .45
 14          X  -1.5     .05       2
 15          K     1       2                                    1
 16          K1                 RESERVOIR  ROUTING
 17          Y                             1
 18          Y1    1                                      1437
 19          $A    0     100     234
 20          $E1236.9   1280    1300
 21          $$ 1280      45    3.88     1.5
 22          $D 1284     2.7     1.5     500
 23          K    99
1                        PREVIEW OF SEQUENCE OF STREAM NETWORK CALCULATIONS

                              RUNOFF HYDROGRAPH AT          1
                              ROUTE HYDROGRAPH TO           2
                              END OF NETWORK


1**********************************
 FLOOD HYDROGRAPH PACKAGE (HEC-1)
 DAM SAFETY VERSION      JULY 1978
   LAST MODIFICATION  26 FEB 79
 **********************************

 RUN  DATE* 80/05/12.
      TIME* 10.35.50.


                    MCCONNELL LAKE DAM   ****   MCCONNELL CREEK
                    BLOOMING GROVE TWP., PIKE COUNTY, PA.
                    NDI # PA-00398     PA DER # 52-91

                                        JOB SPECIFICATION
          NQ      NHR     NMIN     IDAY      IHR     IMIN    METRC     IPLT     IPRT    NSTAN
         300        0       15        0        0        0        0        0       -4        0
                                   JOPER      NWT    LROPT    TRACE
                                       5        0        0        0


                                  MULTI-PLAN ANALYSES TO BE PERFORMED
                                      NPLAN= 1 NRTIO= 9 LRTIO= 1
                RTIOS=   1.00     .85     .70     .60     .50     .40     .30     .20     .10

**********          **********          **********          **********          **********

                                  SUB-AREA RUNOFF COMPUTATION

                                  INFLOW HYDROGRAPH
```

BLOOMING GROVE TWP., PIKE COUNTY, PA.
NDI # PA-00398 PA DER # 52-91

JOB SPECIFICATION

NQ	NHR	NMIN	IDAY	IHR	IMIN	METRC	IPLT	IPRT	NSTAN
300	0	15	0	0	0	0	0	-4	0

JOPER	NWT	LROPT	TRACE
5	0	0	0

MULTI-PLAN ANALYSES TO BE PERFORMED
NPLAN= 1 NRTIO= 9 LRTIO= 1
RTIOS= 1.00 .85 .70 .60 .50 .40 .30 .20 .10

********** ********** ********** ********** **********

SUB-AREA RUNOFF COMPUTATION

INFLOW HYDROGRAPH

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
1	0	0	0	0	0	1	0	0

HYDROGRAPH DATA

IHYDG	IUHG	TAREA	SNAP	TRSDA	TRSPC	RATIO	ISNOW	ISAME	LOCAL
1	1	2.30	0.00	2.30	0.00	0.000	0	0	0

PRECIP DATA

SPFE	PMS	R6	R12	R24	R48	R72	R96
0.00	21.60	111.00	123.00	133.00	142.00	0.00	0.00

TRSPC COMPUTED BY THE PROGRAM IS .800

LOSS DATA

LROPT	STRKR	DLTKR	RTIOL	ERAIN	STRKS	RTIOK	STRTL	CNSTL	ALSMX	RTIMP
0	0.00	0.00	1.00	0.00	0.00	1.00	1.00	.05	0.00	0.00

UNIT HYDROGRAPH DATA
TP= 1.41 CP= .45 NTA= 0

RECESSION DATA
STRTQ= -1.50 QRCSN= .05 RTIOR= 2.00

UNIT HYDROGRAPH 52 END-OF-PERIOD ORDINATES, LAG= 1.41 HOURS, CP= .45 VOL= 1.00

31.	114.	231.	350.	437.	470.	446.	400.	358.	321.
288.	258.	231.	207.	186.	167.	149.	134.	120.	107.
96.	86.	77.	69.	62.	56.	50.	45.	40.	36.
32.	29.	26.	23.	21.	19.	17.	15.	13.	12.
11.	10.	9.	8.	7.	6.	6.	5.	4.	4.
4.	3.								

0 END OF-PERIOD FLOW

MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q	MO.DA	HR.MN	PERIOD	RAIN	EXCS	LOSS	COMP Q

SUM	24.54	22.15	2.39	130860.	
	(623.)	(563.)	(61.)	(3705.77)	

********** ********** ********** ********** **********

HYDROGRAPH ROUTING

RESERVOIR ROUTING

ISTAQ	ICOMP	IECON	ITAPE	JPLT	JPRT	INAME	ISTAGE	IAUTO
2	1	0	0	0	0	1	0	0

ROUTING DATA

QLOSS	CLOSS	AVG	IRES	ISAME	IOPT	IPMP	LSTR
0.0	0.000	0.00	1	0	0	0	0

NSTPS	NSTDL	LAG	AMSAK	X	TSK	STORA	ISPRAT
1	0	0	0.000	0.000	0.000	1437.	0

SURFACE AREA=	0.	100.	234.
CAPACITY=	0.	1437.	4683.
ELEVATION=	1237.	1280.	1300.

CREL	SPWID	COQW	EXPW	ELEVL	COQL	CAREA	EXPL
1280.0	45.0	3.9	1.5	0.0	0.0	0.0	0.0

DAM DATA

TOPEL	COQD	EXPD	DAMWID
1284.0	2.7	1.5	500.

PEAK OUTFLOW IS 4927. AT TIME 41.75 HOURS

PEAK OUTFLOW IS 4093. AT TIME 42.00 HOURS

PEAK OUTFLOW IS 3224. AT TIME 42.25 HOURS

PEAK OUTFLOW IS 2622. AT TIME 42.50 HOURS

PEAK OUTFLOW IS 1983. AT TIME 43.00 HOURS

PEAK OUTFLOW IS 1344. AT TIME 43.50 HOURS

PEAK OUTFLOW IS 971. AT TIME 43.50 HOURS

PEAK OUTFLOW IS 607. AT TIME 43.75 HOURS

PEAK OUTFLOW IS 266. AT TIME 44.00 HOURS

********** ********** ********** ********** **********

********** ********** ********** ********** **********

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO FLOWS RATIO 1 1.00	RATIO 2 .85	RATIO 3 .70	RATIO 4 .60	RATIO 5 .50	RATIO 6 .40	RATIO 7 .30	RATIO 8 .20	RATIO 9 .10
HYDROGRAPH AT	1	2.30	1	5377.	4570.	3764.	3226.	2688.	2151.	1613.	1075.	538.
	(	5.96)	(	152.25)(	129.41)(	106.57)(	91.35)(	76.12)(	60.90)(	45.67)(	30.45)(	15.22)
ROUTED TO	2	2.30	1	4927.	4093.	3224.	2622.	1983.	1344.	971.	607.	266.
	(	5.96)	(	139.51)(	115.91)(	91.31)(	74.26)(	56.14)(	38.05)(	27.50)(	17.20)(	7.55)

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 .....

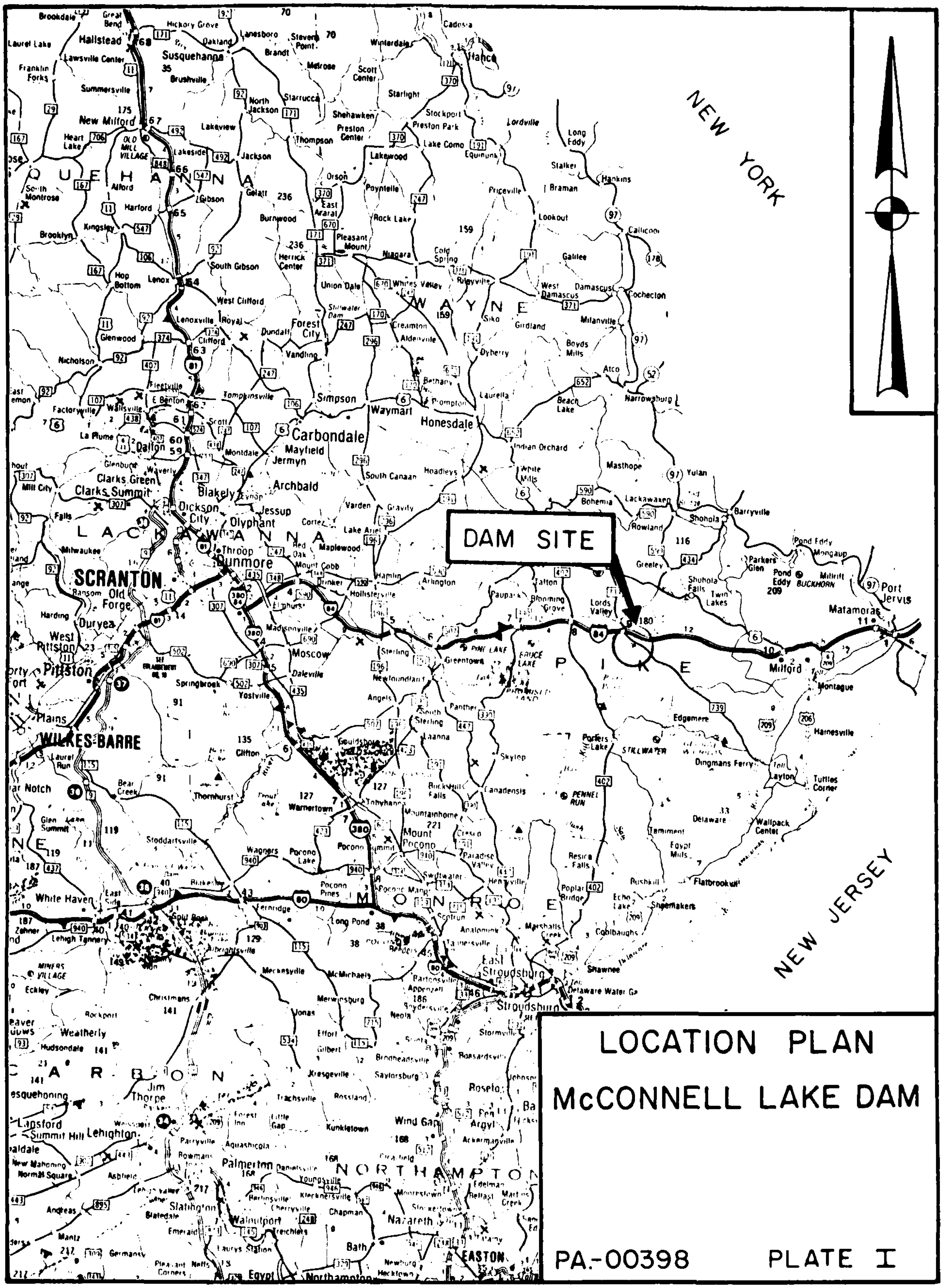
	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	1280.00	1280.00	1284.00
STORAGE	1437.	1437.	1891.
OUTFLOW	0.	0.	1397.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
1.00	1285.56	1.56	2079.	4927.	6.50	41.75	0.00
.85	1285.29	1.29	2043.	4093.	6.00	42.00	0.00
.70	1284.97	.97	2002.	3224.	5.00	42.25	0.00
.60	1284.72	.72	1971.	2622.	4.25	42.50	0.00
.50	1284.42	.42	1932.	1983.	3.25	43.00	0.00
.40	1283.90	0.00	1868.	1344.	0.00	43.50	0.00
.30	1283.14	0.00	1777.	971.	0.00	43.50	0.00
.20	1282.30	0.00	1681.	607.	0.00	43.75	0.00
.10	1281.33	0.00	1574.	266.	0.00	44.00	0.00

EOI ENCOUNTERED.

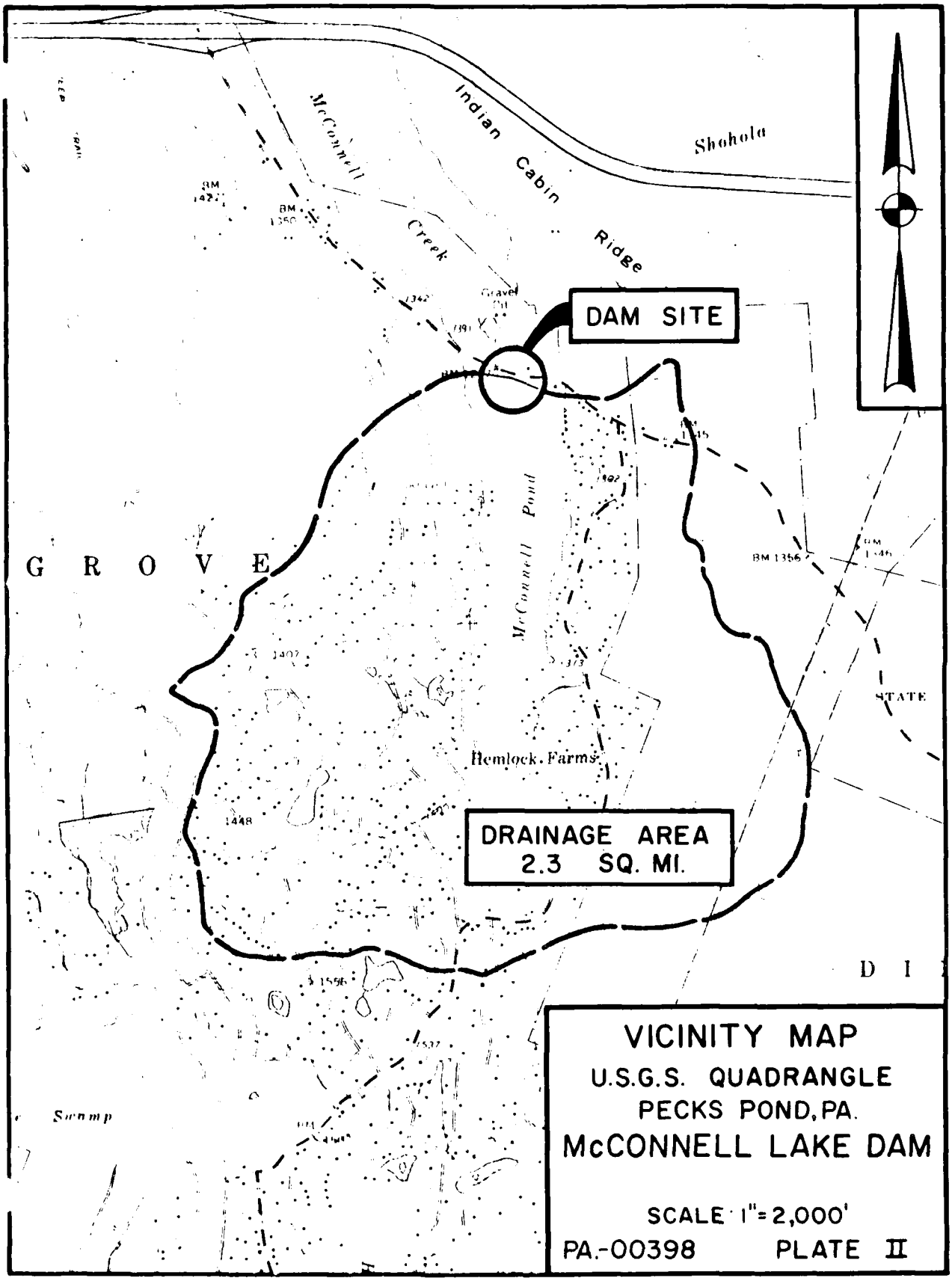
APPENDIX E

PLATES



LOCATION PLAN
McCONNELL LAKE DAM

PA-00398 PLATE I



VICINITY MAP

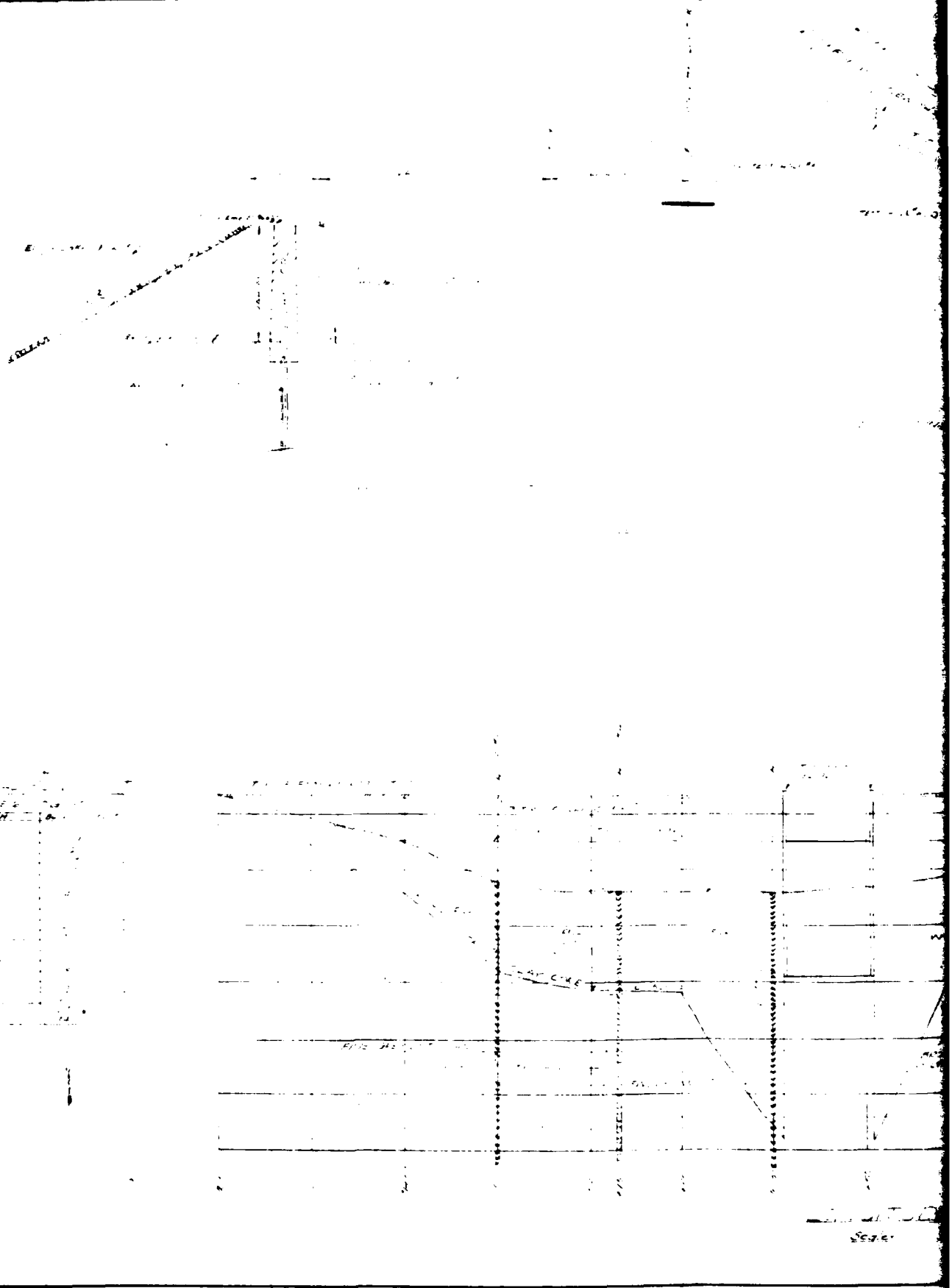
U.S.G.S. QUADRANGLE

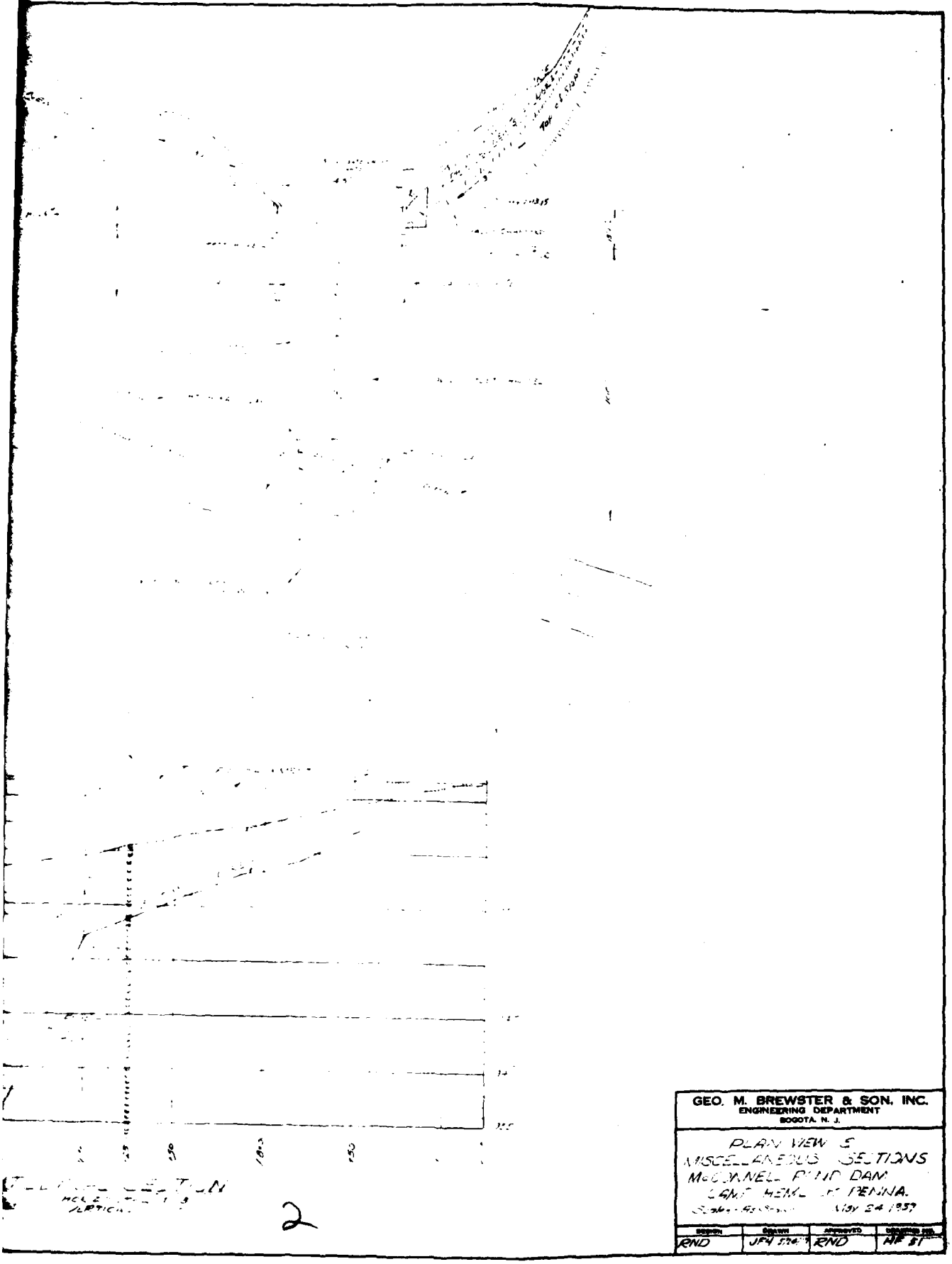
PECKS POND, PA.

McCONNELL LAKE DAM

SCALE 1" = 2,000'

PA.-00398 PLATE II



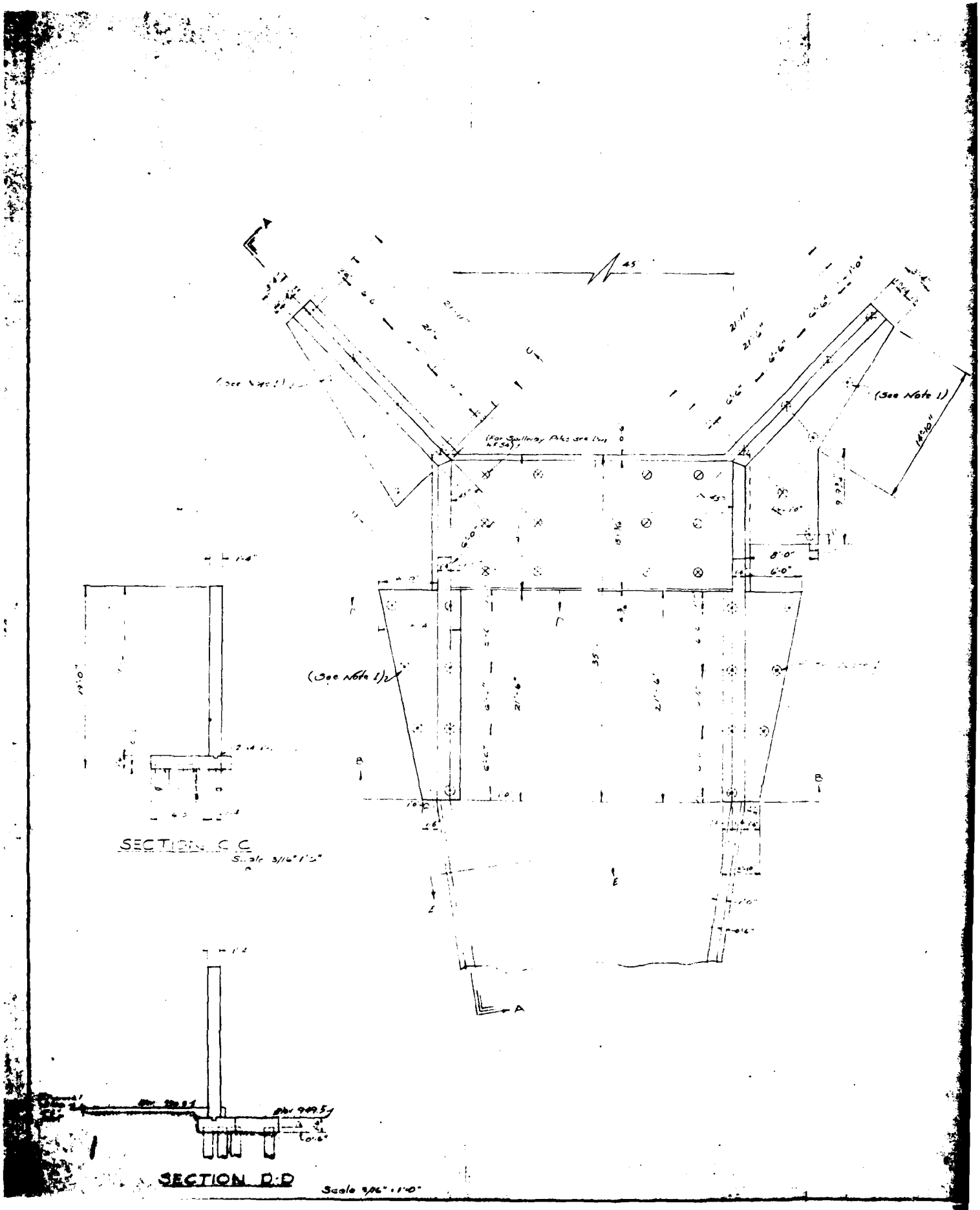


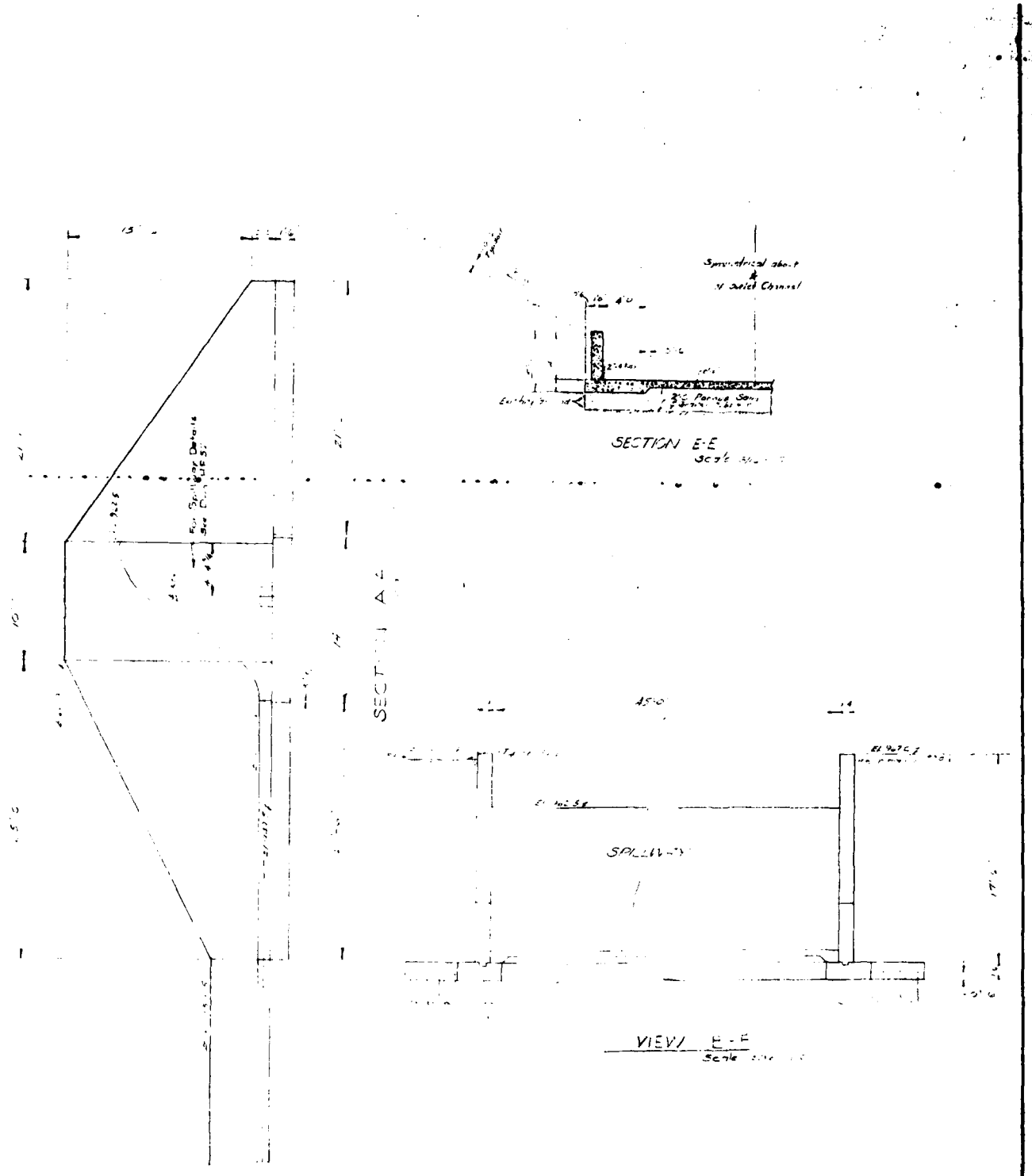
GEO. M. BREWSTER & SON, INC.
ENGINEERING DEPARTMENT
BOGOTA, N. J.

PLAN VIEW & MISCELLANEOUS SECTIONS
McCONNELL POND DAM
LIGHT HEAT & POWER CO. OF PENNA.
Scale - As Shown May 24 1937

DESIGN	DRAWN	APPROVED	DRAWING NO.
RND	JPH	RND	HP 81

PA-00398
PLATE III


(See Note 1)
(See Note 1)
(See Note 1)/2
A
B
B
A
SECTION C C
Scale 3/16" = 1'-0"
SECTION D-D
Scale 3/16" = 1'-0"



NOTES

1 Ø Corrugated Metal Pipe 10-2-8 15'-0" Long
2 CONCRETE MIX
a Valve Chamber & Walls 1:1½:3
b Spillway & Footings 1:2:4
3 All concrete to Walls, Spillway, & Footings to be reinforced
4 16 oz Copper Expansion joint to be used on all joints upstream from Spillway

2

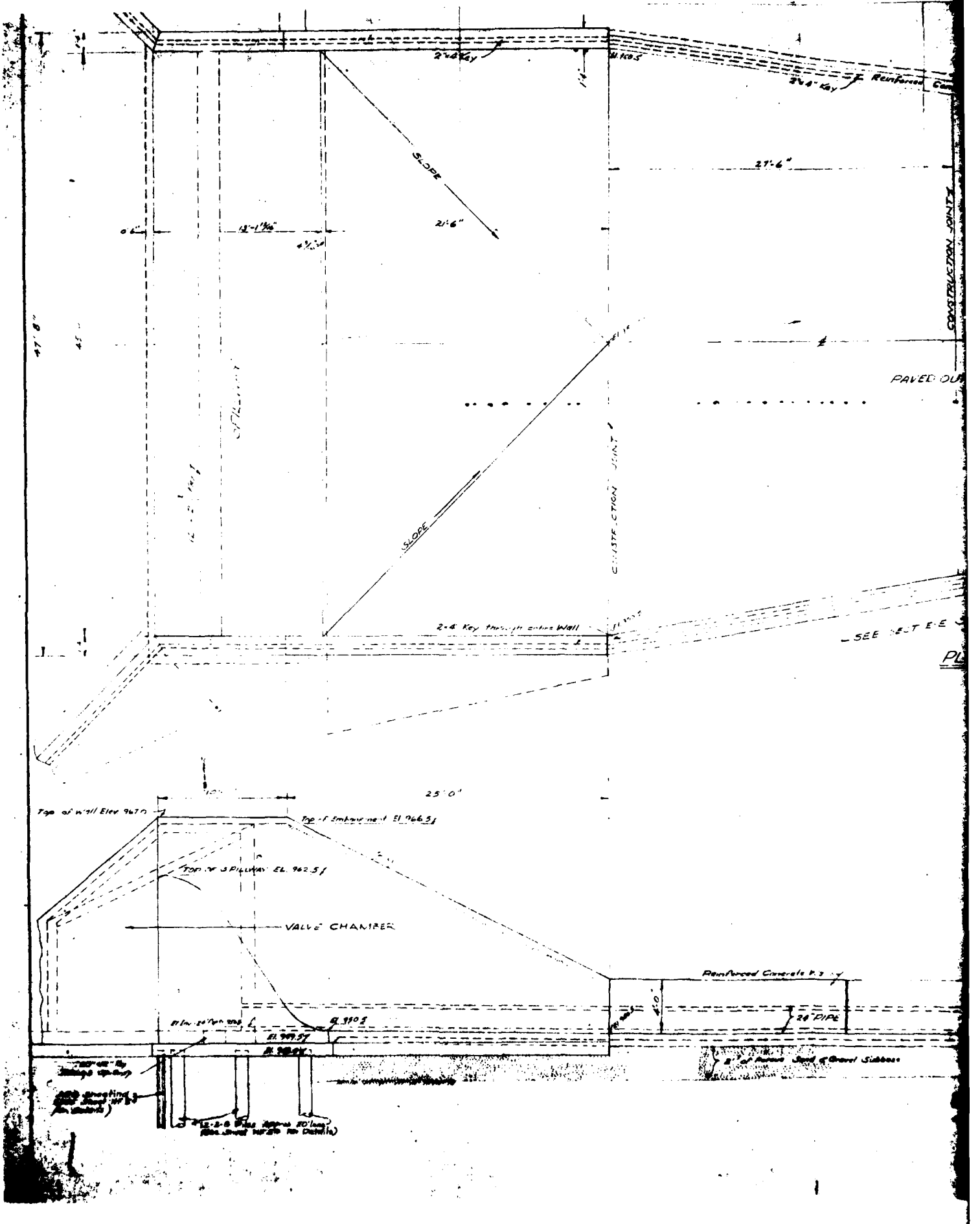
GEO. M. BREWSTER & SON, INC.
ENGINEERING DEPARTMENT
BOGOTA, N. J.

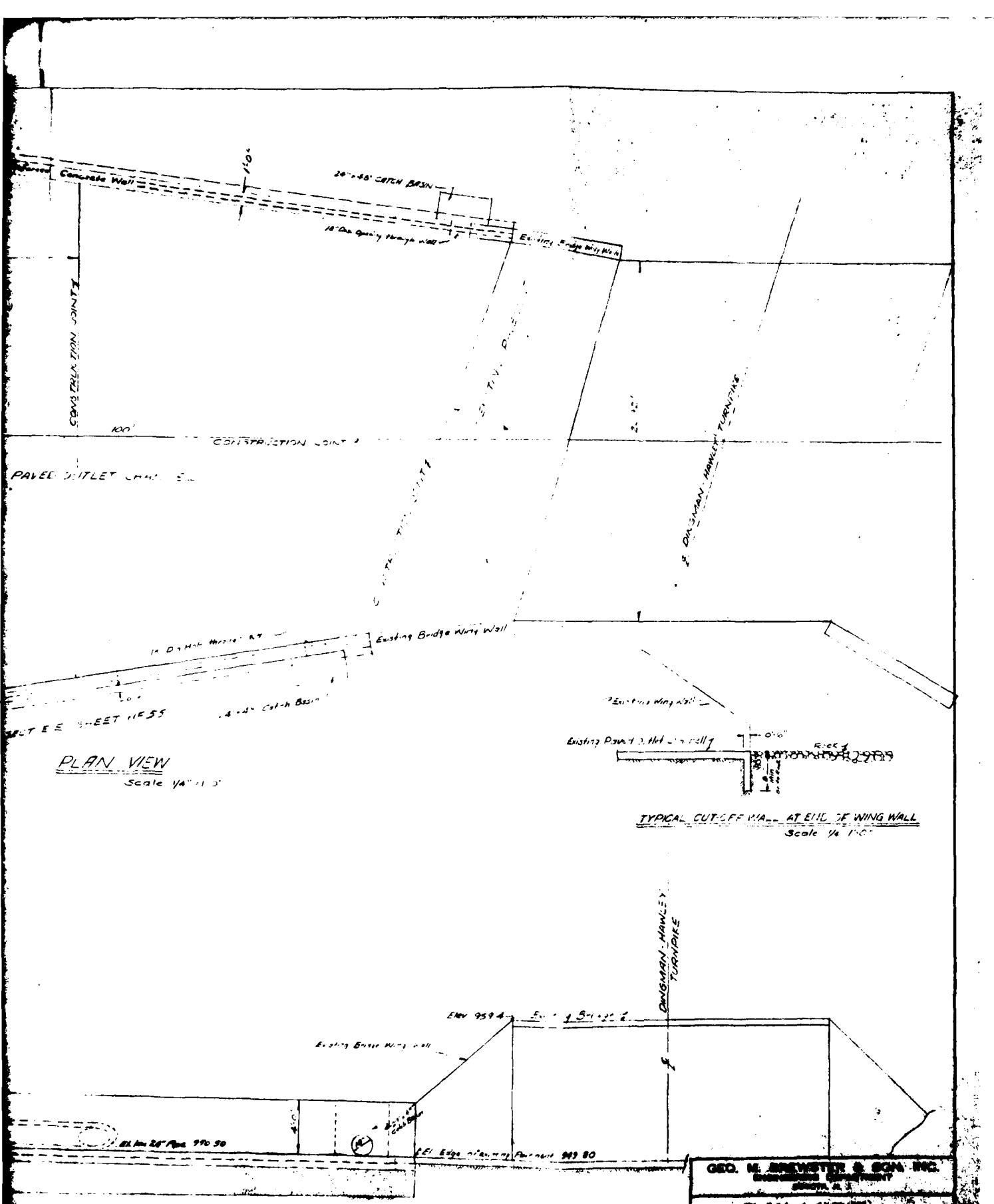
WALLS & FOOTINGS DETAILS & PILING LAYOUT
McCONNELL POND DAM
HEMLOCK FARM, PA.

Scale 3/16" = 1'-0" Date

DRAWN	JOB NO.	SHEET NO.

PA-00398
PLATE IV


2'-6" Key
SLOPE
2:1
27'-6"
CONSTRUCTION JOINT
PAVED
2'-6" Key through entire Wall
SEE
25'-0"
Top of Wall Elev 967.0
Top of Embankment El 966.5
Top of Spillway EL 962.5
VALVE CHAMBER
Reinforced Concrete
20" PIPE
El 950.5
El 949.5
El 948.5

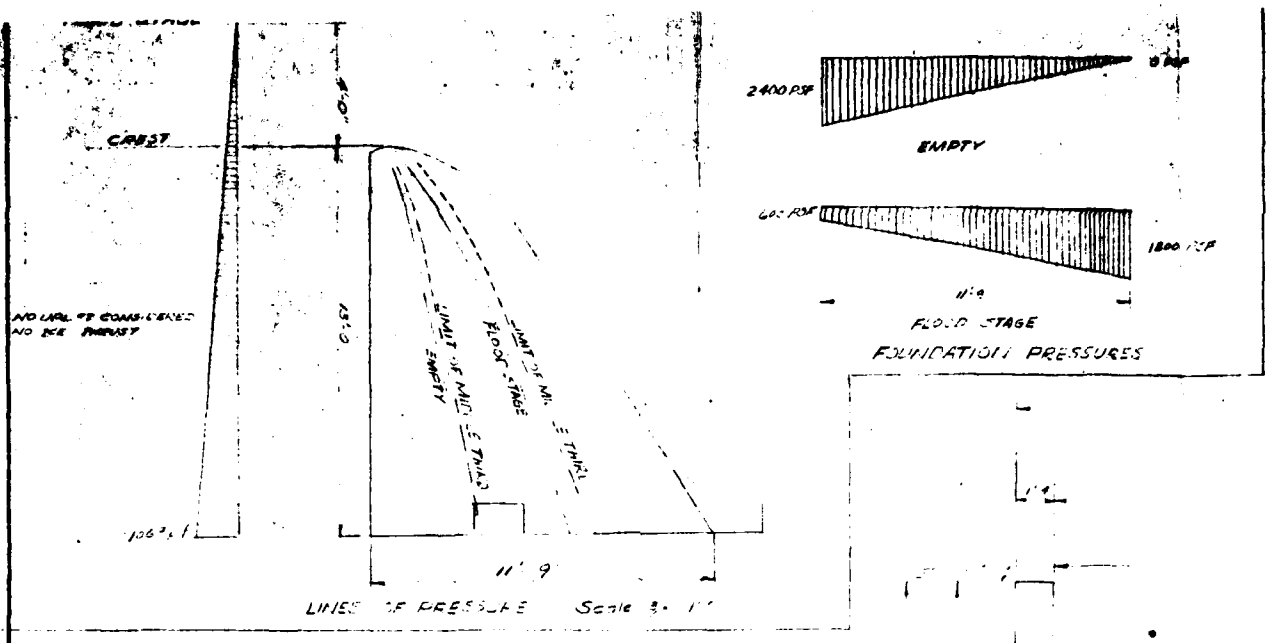


2

GEO. M. BREWSTER & SON, INC.
ENGINEERING DEPARTMENT
DENVILLE, N. J.

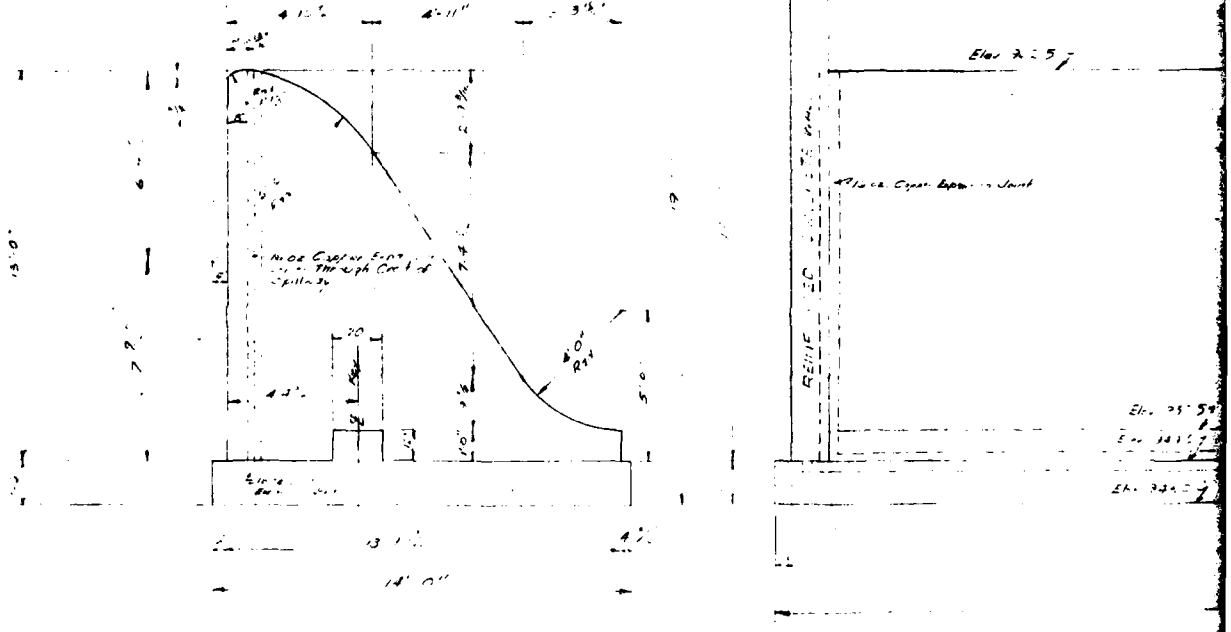
PLAN LAYOUT
McCONNELL POND DAM
HEMLOCK FARMS

PA-003
PLATE

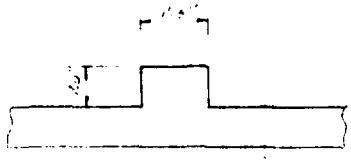


LINES OF PRESSURE Scale 1" = 1'

FOUNDATION PRESSURES

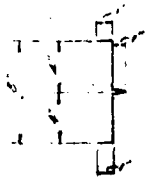


TYPICAL SPILLWAY SECTION



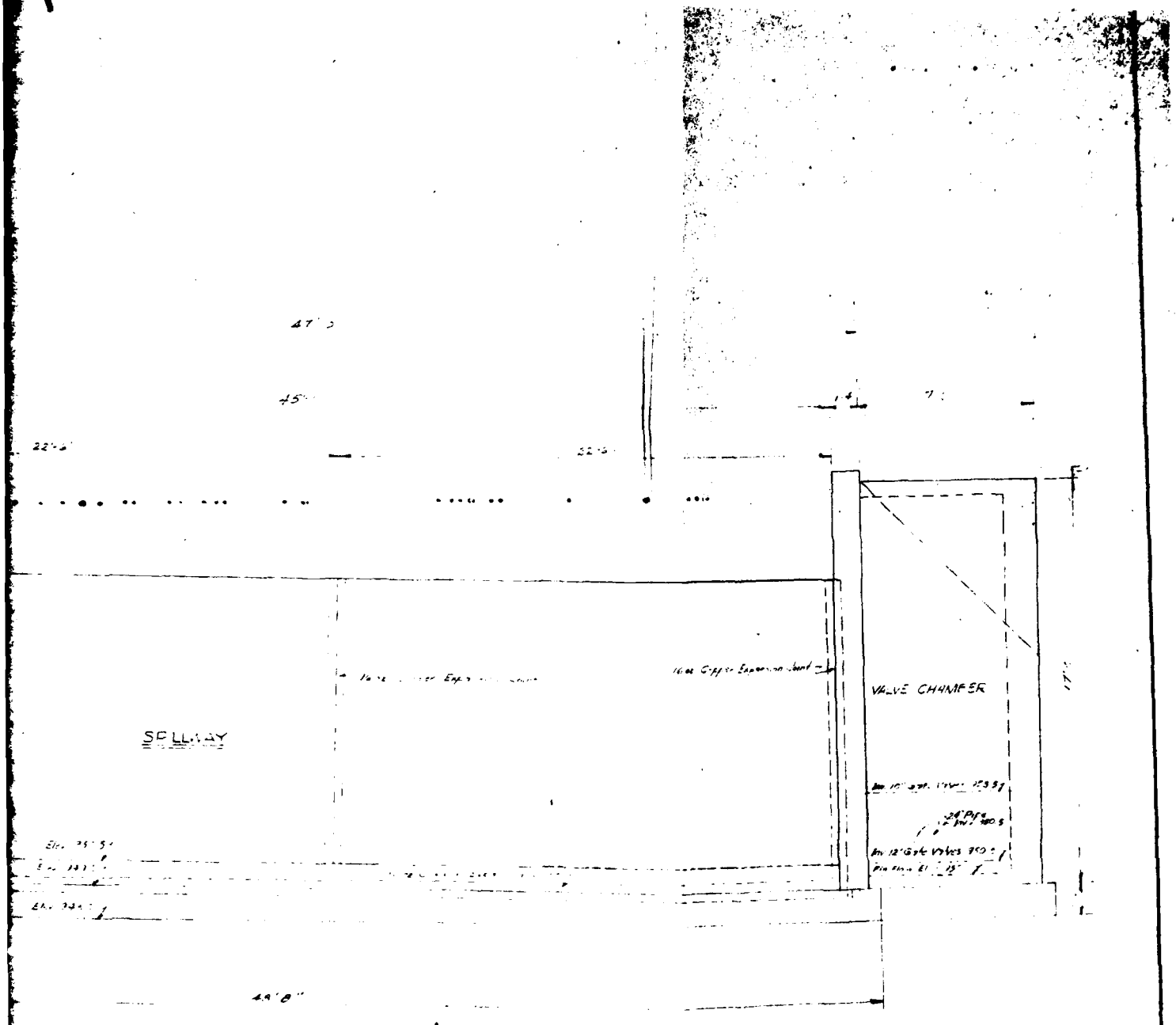
TYPICAL KEY DETAIL

NO SCALE



16 oz. COPPER EXPANSION JOINT

NO SCALE



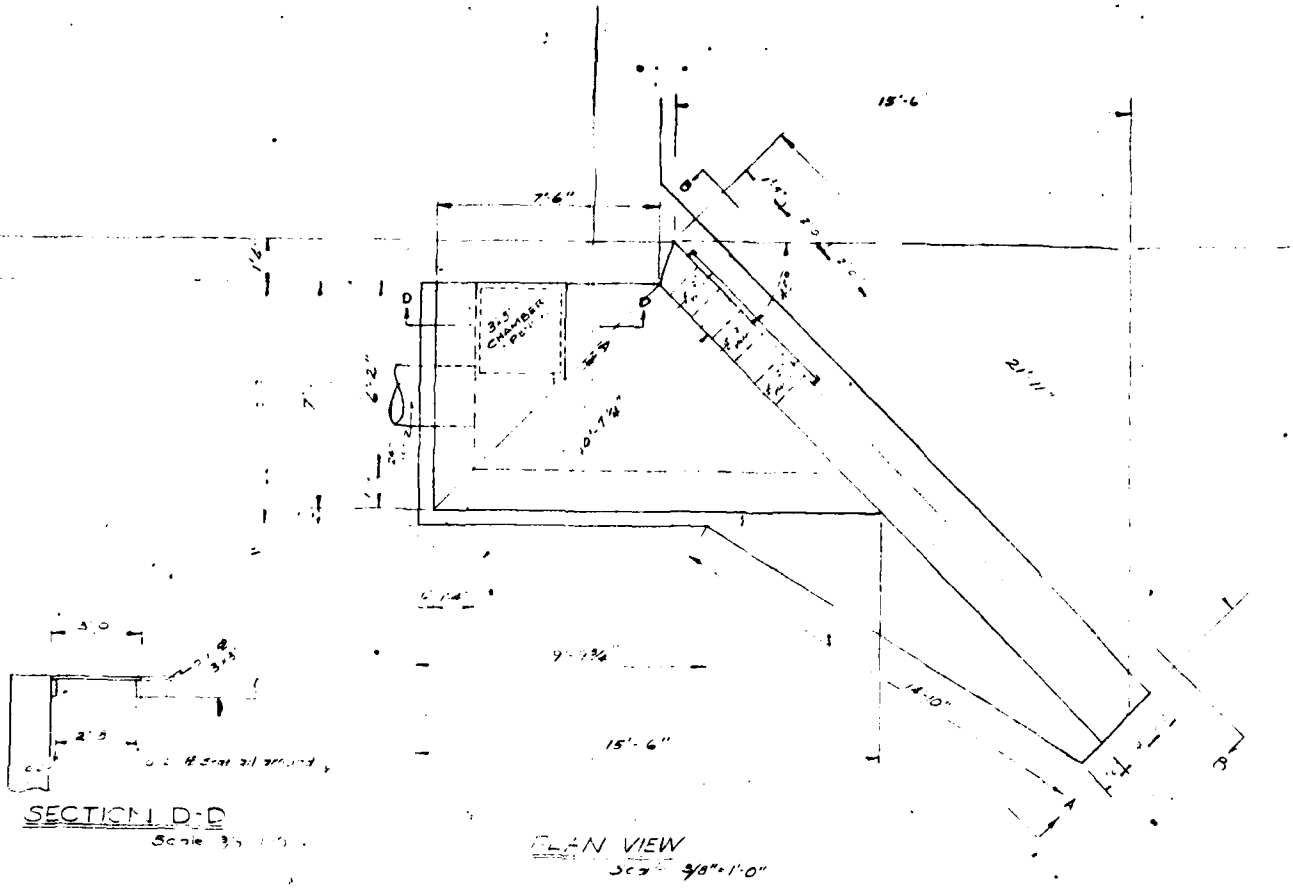
FRONT ELEVATION

GEO. M. BREWSTER & SON, INC.
ENGINEERING DEPARTMENT
BOGOTA, N. J.

SPILLWAY & VALVE CHAMBER LAYOUT
McCONNELL POND DAM
MERLOCK FARMS, INC.

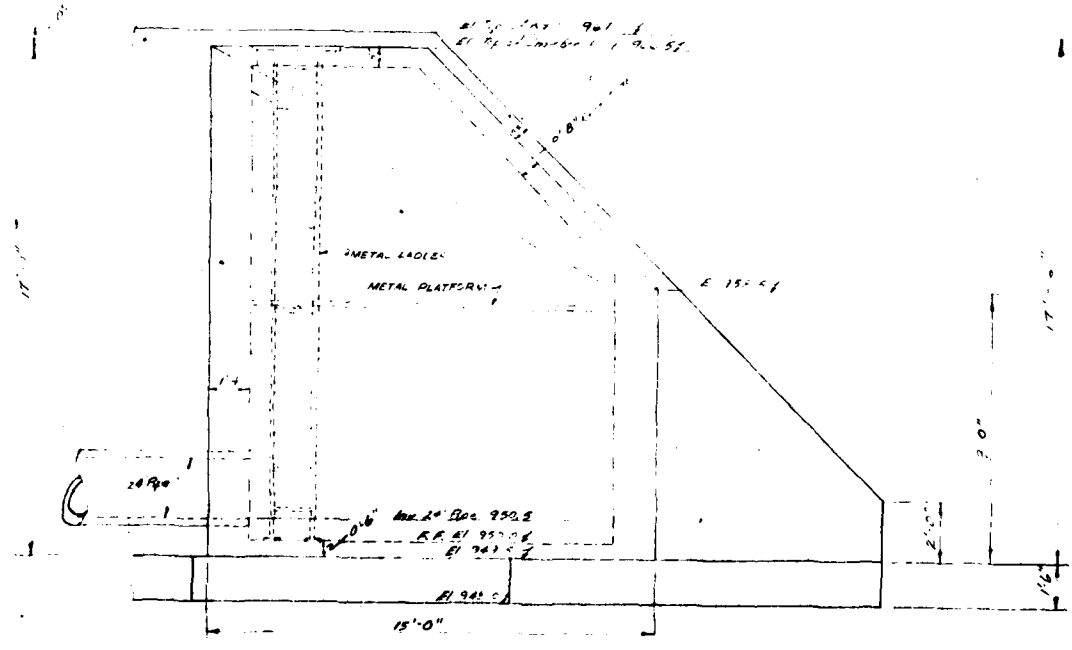
PA-0
PLAT

2

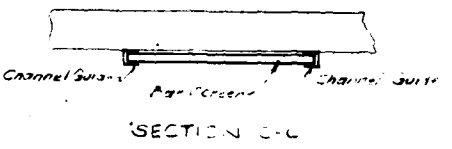


SECTION D-D
Scale 3/8" = 1'-0"

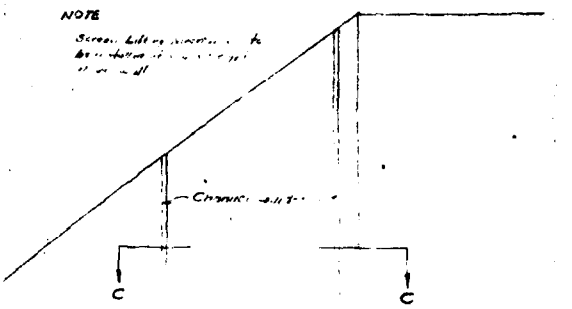
PLAN VIEW
Scale 3/8" = 1'-0"

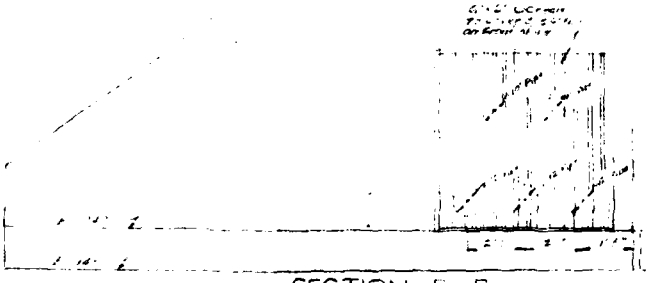


ELEVATION VIEW
Scale 3/8" = 1'-0"



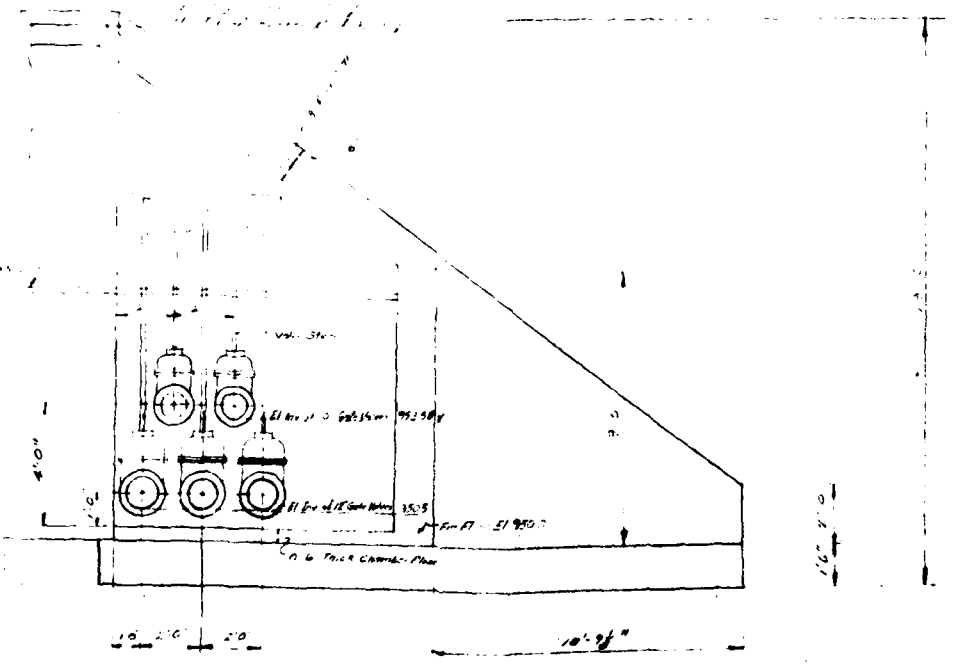
SECTION C-C





SECTION B-B

Scale



SECTION A-A

GEO. M. BREWSTER & SON, INC.
ENGINEERING DEPARTMENT
ROCKTA, N. J.

VALVE CHAMBER DETAILS
McCONNELL POND DAM
CAMP HEMLOCK, PENNA.

Scale 3/4"=1'-0" May 27, 1941

PA-0
PLAT

2

APPENDIX F

GEOLOGIC REPORT

GEOLOGIC REPORT

Bedrock - Dam and Reservoir

Formation Name: Long Run - Walcksville Member of the Catskill Formation.

Lithology: Predominantly medium to coarse grained, greenish gray to medium gray sandstone, interbedded with red shale, claystone and siltstone. The sandstone is very thick, bedded with distinct cross lamination. The beds are arranged in upward fining cycles, ten to hundred feet thick. Locally lenses of calcite cemented conglomerate are present at the base of the cycles; but these lenses rarely extend more than a few tens of feet laterally.

Structure

The dam is located in the Pocono Plateau and the beds are essentially horizontal. There is a very low regional dip to the northwest. No faults are mapped in the vicinity.

Air fracture traces trend: N5° - 10°E, N75°E, N60°W and N45°W.

Overburden

This dam was built on top of an old dam that had been rebuilt at least once. Records of borings taken along the center line of the new dam indicate eight to ten feet of "fill" and "coarse gravel fill" over ten or more feet of "fine gray silty sand" and "fine brown silty sand." No rock is indicated. This latter material is interpreted as glacial till. It is at least twenty feet thick under the spillway.

Aquifer Characteristics

The rocks of the Catskill Formation are essentially impermeable, and ground water movement is entirely along bedding planes and fractures. The most permeable aquifers in the area are the sands and gravels of the glacial outwash in the valleys. Permeable zones also exist locally in the glacial till.

Discussion

The plans show that the clay filled core trench was to bottom generally in the "coarse gravel fill." Under the spillway steel piling was to be driven about 18 feet into the "fine brown silty sand." This probably represents glacial till, with some outwash

sand. It is thickest in the area of the pre-glacial stream channel. If this material is indeed till, it probably is a suitable foundation for this dam.

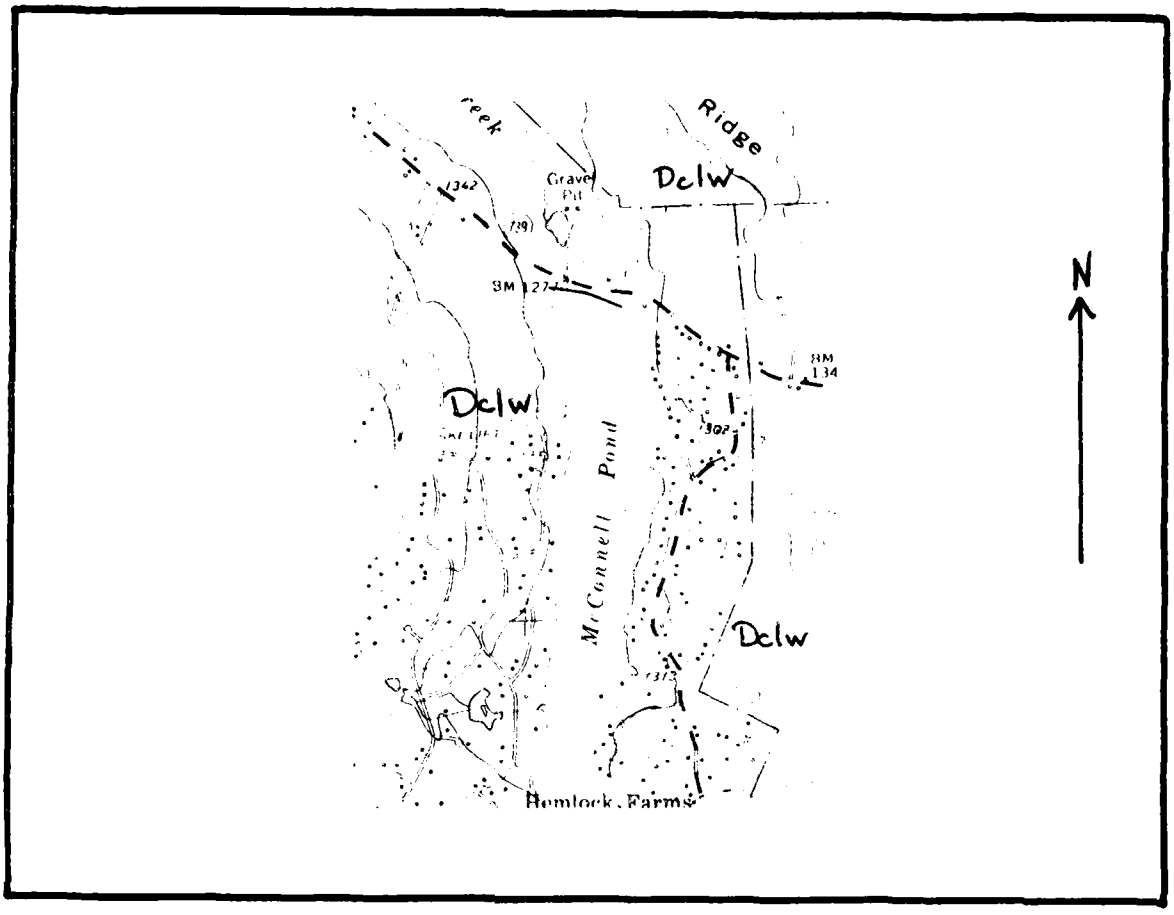
Sources of Information

1. Sevon, W.D., et al, "Geology and Mineral Resources of Pike County," open file report, Pa. Geologic Survey, Harrisburg, Pa.

2. Air photographs dated 1973, scale 1:40,000.

3. Plans and inspection reports in file.

GEOLOGIC MAP - McConnell Lake Dam



Dclw — Catskill Fm.- Long Run/Walcksville member

— · — · air photo fracture trace

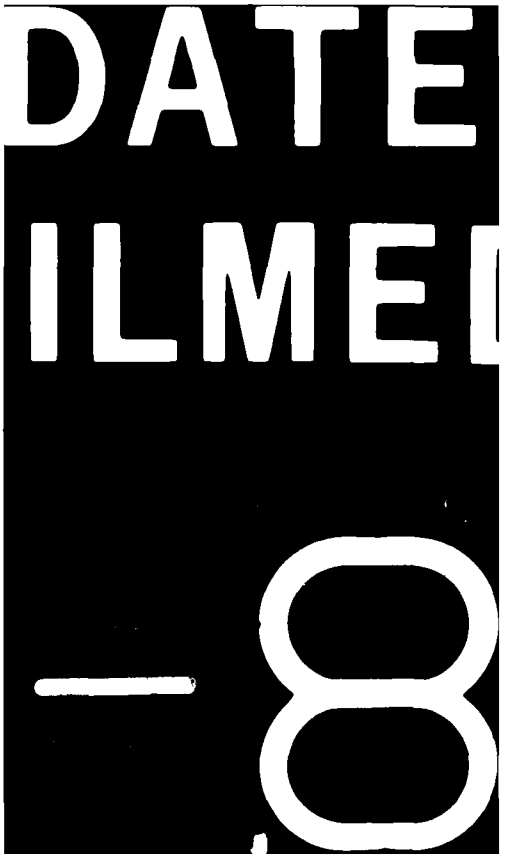
SCALE 1:24000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

.5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET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